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VETERINARY MEDICINE

FEBRUARY 1944

CONTENTS

Veterinary Progress, Policies and Comment 41-45

Guava Rich in Vitamin C, 41; Artificial Light Shortens Gestation Period, 41; Vitamin C Saved in Dehydration, 41; "One Pint of Blood for Every Star in Each Company's Service Flag," 41; Egg Shells Equal Oyster Shells for Growing Chicks, 41; Epidemics of Milk-Borne Diseases in England, 41; A Plasma Substitute, 42; Fox Carcasses for Fox Food, 42; Public Hearing on Anti-Hog Cholera Agreement, 42; Missouri's Community Sales Law, 42; Quartermaster Corps Acquires Kellogg Arabian Stud Farm, 43; Red Blood Cell Powder for Wounds, 44; Hens Convert Carotene into Vitamin A, 44; Saving from Bovine Tuberculosis Eradication Equals Lend-Lease Shipments, 44; Use of Bone Flour to Prevent Caries, 44; Crystal Violet Vaccine, 44; Disease Control Requires Professional Training, 45; Vaccination of Heifers Controls Abortion, 45; Talcum Powder a Hazard in Abdominal Surgery, 45.

Experimental Transmission of Equine Infectious Anemia by Contact and Body Secretions and Excretions 46

Swine Erysipelas 53

Treatment of Canine Coccidiosis 59

Cough, Its Physiology and Treatment 62

Unusual Outcome of Superfetation in a Cow 64

Autobiography of a Veterinary Practioner 66

Urinary Calculi in a Dalmatian 73

Removal of Ocular Neoplasm 73

Hypertrophy of Incisors in a Rabbit 74

Cotton-Wool Diet to Remove Needle from Dog's Stomach 74

Improper Castration in Feeder Steers 75

Spirochetosis in a Dog 75

A Case of Parasitism 76

Abstracts 77-78

Laboratory Findings from Swine Disease Specimens, 77; Sulfonamides for Operative Wounds, 78; Plaster Casts for Burns, 78; Local Anesthetics Useful in Pneumonia, 78.

Book Reviews 79-80

The Horse; His Gaits, Points and Conformation, 79; Diseases and Parasites of Rabbits and Their Control, 79; The Biological Action of the Vitamins, 79; The Practice of Veterinary Medicine, 80; A Text-Book of the Diseases of the Small Domestic Animals, 80; Third Nutritional Conference for Veterinarians, 80; Horses; Their Selection, Care and Handling, 80.

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No. 2

Entered as second-class matter Nov. 8, 1920, at the post office at Chicago, Ill., under the Act of March 3, 1879.

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The tropical guava is so rich in vitamin C that 100 grains of the powdered fruit contains up to 3000mg of this vitamin.

Experiments conducted at Swarthmore College demonstrate that the long gestation period of the marten—August 'till April—can be shortened about four months by the use of artificial light in the dam's quarters thus shortening the period of darkness by several hours.

In air-dehydration of foodstuffs, 50% or more of the vitamin C is lost but if the food is dried in a natural gas atmosphere, practically all the vitamin C (ascorbic acid) is saved. Tests on green, leafy animal feeds, in regions of natural gas, indicate that under the gas-drying method, the foods keep longer than when air is used in drying.

At the suggestion of Maj. Gen. Norman T. Kirk, Surgeon General of the U. S. Army, the American Meat Institute has launched a nation-wide campaign in the meat packing industry to promote the donation, by packinghouse officials and employees, of human blood from which plasma is processed, on the basis of "one pint for every star in each company's service flag."—*Nat'l Provisioner.*

Tests made at Iowa State College indicate that egg shells are equal to oyster shells for either laying hens or growing chicks. The shell should be free of egg white and be sterilized and ground.

The enormous growth of Equine encephalomyelitis virus in chick embryo is emphasized by the estimate of one investigator (C. A. Mitchell) that the brains from five billion horses would be required to equal in virus content that of one 4-grain infected chick embryo.

In England and Wales, about 1500 to 2,000 deaths of human beings occur annually from tuberculosis of bovine origin, and 400 to 500 cases of undulant fever in addition to other milk-borne diseases. In the period 1912-37 there were 113 epidemics of milk-borne disease in Great Britain affecting 14,000 persons.

In the past year scientific staffs for the Ministry of Agriculture (England) made 115,000 separate soil analyses. These were of especial value to determine to what extent the soil contains the wire worm and to make recommendations upon these findings as to the best suitable crop for the given areas. These analyses also showed the state of the soil regarding deficiencies of essential minerals.

Plasma Substitute

In experiments on the use of gelatin as a substitute for plasma in the treatment of burns conducted by scientists of the University of Pennsylvania School of Medicine, it was found that normal dogs tolerated repeated infusions of large volumes of gelatin-saline solution without any serious toxic reactions due to the gelatin. In rapid massive hemorrhage, infusion of gelatine proved to be superior to saline. In slow massive hemorrhage, which caused the death of untreated animals, again gelatin was more effective than saline and recovery occurred as rapidly as from plasma infusions.—*Annals of Surgery* (August, 1943).

Fox Carcasses for Fox Food

Experiments conducted by Harris and Loosli* of Cornell University to determine the comparative value of horse meat and fox carcasses as a feed for fur animals, indicated that there is no significant difference when a test ration containing 25% fox carcass (stomach and intestines removed) was fed to foxes and minks to that of controls receiving the same percentage of horse meat in the ration. The health of the animals and their general condition remained relatively the same on the two diets. It would seem that fox carcasses could replace horse meat and beef meal or other protein concentrates to the extent of their protein content, and bone meal or other calcium and phosphorus concentrates to the extent of their calcium and phosphorus content. The carcass of a mature fox (medium in condition) contains in per cent 34.7 dry matter, 19.9 protein, 10.0 fat, 4.24 ash, 1.30 calcium and 0.804 phosphorus. The carcasses should be ground and then frozen for future use. Only carcasses of healthy animals should be used.

In line with the above conclusions it is of interest to note that there are available 150,000 muskrat carcasses yearly—the number of animals annually removed from waterfowl refuges in various parts of the United States—for food for fur animals. Further information regarding arrangements for securing carcasses may be had by writing the Fish and Wildlife Service, U. S. Department of Interior, Merchandise Mart, Chicago, 54.

*Harris, Lorin E., and Loosli, John K., Fox carcasses as a source of protein. *The Amer. Nat'l. Fur and Mkt. Jnl.*, Dec., 1943.

Public Hearing on Anti-Hog Cholera Agreement

This hearing will be held in Washington, D. C., January 24, to consider further evidence concerning amendments to the marketing agreement for handlers of anti-hog cholera serum and anti-hog cholera virus. The agreement now in effect was authorized by an act of Congress and became effective in 1936. The amendments to be considered were drafted by representatives of the serum industries.

New Community Sales Law in Missouri

The 62nd session (1943) of the General Assembly of Missouri enacted a statute which provides for official regulation of community sales and vests the state veterinarian with authority to administer it and to establish certain regulations for the purpose. The intent of the law is to assure to consignors of animals reimbursement (through the instrumentality of a bond, to prevent fraud in the representations as to animals offered for sale) and to limit the spread of animal disease by such sales. An animal license (fee $35) is required of those who operate community sales. It may be revoked for violation of provisions of the law or regulations. All animals offered for sale must have been inspected by a licensed veterinarian who has authority to reject any animals deemed unfit and to quarantine such animals as may be necessary to prevent the spread of disease.

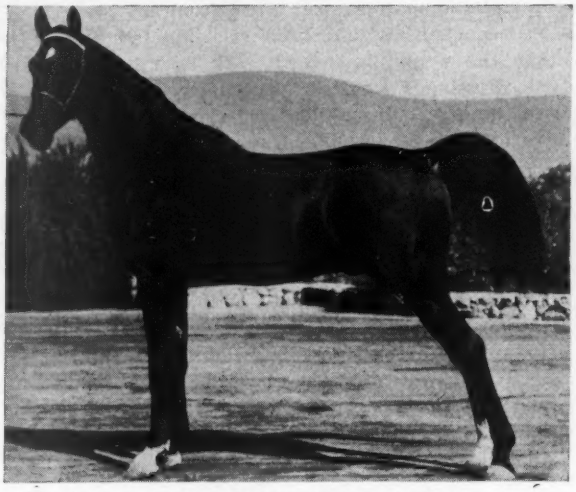
A weakness of the law is the failure to specify any equipment such as yards, pens, shelters, etc., which licensees must provide. Nor is the state veterinarian authorized to require such provisions for the comfort or humane treatment of animals or to facilitate measures for the control of infections. Presumably copies of the law (Senate Bill No. 111943) may be had on request, from the State Veterinarian, Jefferson City.

Army Acquires Valuable Kellogg Arabian Stud Farm

The valuable Kellogg Arabian Stud Farm at Pomona, California, consisting of approximately 750 acres, together with Mr. Kellogg's own adjoining 50-acre modern ranch, both valued at more than $2,600,000 have been acquired by the Government for the use of the Remount Branch of the Quartermaster Corps.

The Kellogg gift provides the Quartermaster Corps not only with approximately 800 acres of pasture and cultivated land and a number of valuable modern improvements, but with an Arab band consisting of over 45 pure-bred Arab mares and 27 purebred Arabian stallions. This band possesses some of the oldest and finest Arab blood in the world. Percherons, draft animals, ponies and cattle are also included.

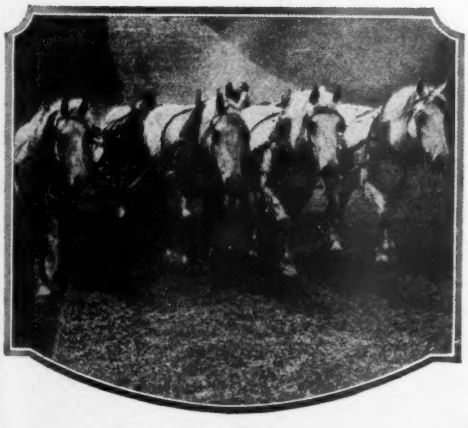
The new property, now official designated as Pomona Quartermaster Depot (Remount), will operate primarily for the purpose of breeding, raising and issuing pure-bred Arab stallions for service. In addition, it will dispose of any surplus stock from time to time by public sale in accordance with existing regulations and will maintain liaison with the Arabian Horse Club of America in order to insure that any surplus animals offered for sale will be appropriately used, thereby preventing dissipation of Arab horse blood for other than breeding purposes.



"Sikin," a purebred Arabian stallion of the Kellogg Arabian stud farm

Buildings include a number of modern, fireproof stables. The premises are equipped with the latest type farm equipment. The main stable contains 30 stalls, administrative offices, tack rooms and forage spaces, frame stable house, work animals and farm equipment.

The farm was established a number of years ago by W. K. Kellogg, Battle Creek, Michigan, manufacturer of cereal breakfast foods.—*The Nat'l Horseman.*



HORSEPOWER—Which requires no gas, oil or rubber, very little iron or steel—less than 5 pounds per horse per year—and is home raised, maintained on farm products, is reliable, flexible and self reproducing.—*Horse and Mule Association of America*

The successful use of blood powder from red blood cells, salvaged from plasma production, has just been reported by doctors of the Mayo Clinic. The powder is applied to open wounds—either dusted or put on with a sterile spatula—and is used one or two times each day and, after each application, the wound is covered with a dry, sterile dressing. Favorable results have followed the use of this red cell blood powder in varicose ulcers, wounds caused by removal of fistulas, etc.

It was reported recently by the poultry husbandry division of the College of Agriculture, University of California, that hens convert carotene into vitamin A with a high degree of efficiency. Hens were fed equivalent unitage of vitamin A potency in the form of either carotene or vitamin A, administered daily at a practical level. The vitamin A potency of the eggs was essentially the same from either form of the vitamin fed. It was also found that the vitamin A potency in eggs was almost entirely in the form of vitamin A and very little in the form of carotene, even when only carotene was fed.—*U. S. Egg and Poultry Mag.*

Bovine Tuberculosis Eradication Saves Equivalent of Lend-Lease Shipments

The lend-lease record is providing a yardstick for measuring results of the campaign for eradication of bovine tuberculosis which the U. S. Department of Agriculture and the states have been waging since 1917. Veterinarians of the federal meat inspection service used to condemn from 40,000 to 50,000 cattle carcasses a year on account of tuberculosis. In recent years, fewer than 2,000 are being condemned on this account. Resultant savings in beef and veal are about 17,000,000 lbs. a year.

The War Food Administration report on lend-lease shipments for the first eight months of the year show that the total of the beef and veal items for the period was just over 13,000,000 lbs., or at a yearly rate roughly equal to the 17,000,000 lbs. of beef and veal now available because tuberculosis has been almost stamped out in U. S. cattle herds.

A patent has been issued on a process for pre-freezing food before it is dehydrated. This process, it is claimed, improves the quality of the food and bleaching by sulfur fumes is unnecessary.

There are indications that the addition of 15 grains of bone flour to the daily diet will go far to prevent caries. Harootian[1] administered this amount of bone flour to nine persons, selected for high incidence and progression of tooth decay for a period of nine months. The progress of caries was arrested in all but one person during the whole period and was but slight in the one exception. The preservation of the teeth is attributed to the fluorine contact of the bone flour.

★ ★ ★ BUY WAR ★ ★ ★
STAMPS AND BONDS

Crystal Violet Hog Cholera Vaccine

Three weeks elapse after vaccine treatment with crystal violet anti-hog cholera before immunity is considered complete. This vaccine does not lower animal resistance, will not bring infection to the premises, and therefore will not contribute to the development or spread of cholera. Immunity develops slowly and the duration of immunity is not permanent. Use 5cc of crystal violet vaccine for pigs up to 75 pounds in weight and 10cc for heavier hogs, by subcutaneous injection on the inner side of the thigh, as deeply as possible, but not in the muscle. Swellings sometimes occur at the point of injection, but nearly always disappear without development of abscesses when proper sanitary practices are observed. Re-treatment with vaccine or anti-hog-cholera serum and hog cholera virus is advised at the end of eight months for breeding stock. Between 21,000 and 22,000 pigs have been inoculated in Iowa with crystal violet vaccine. Immunity tests have been conducted on approximately 1,000 pigs in herds from 250 farms. Approximately 83% were considered properly protected for immunity, 12% showed severe reaction, and 5% died.—C. G. Cole.

[1] *Jnl. Amer. Dental Assn.*, Sept., 1943.

Disease Control Requires Professional Training

Practically all veterinary research in this country has been carried out with the end in view of developing something the livestock owner could put into practice to his advantage. With few exceptions, bulletins reporting the results of veterinary research are written for distribution to livestock owners with the expectation that they will profit most by attempting to carry out these measures themselves.

The medical profession does not and never has carried out its research in this manner or relied upon the public to employ the findings of its research other than through its physicians. It seems obvious, even if the more rapid progress of medical research and improvement in public health does not prove it, that veterinary research in this country is neither carried out nor administered on the plan most advantageous to animal husbandry and that more rapid progress would be made in the control and elimination of animal disease if veterinary research were directed to the improvement of preventive and clinical veterinary medicine and the benefits of its discoveries made available to the livestock industry through the veterinary profession, whose members are trained in the handling of animal disease. Nor need we go outside of our own province for an illustration of the superiority of placing medical problems in the hands of those medically trained, over placing such problems in the hands of the untrained, however complete the information supplied to the latter.

The management of bovine tuberculosis and of hog cholera in this country are outstanding examples of the two methods of approach. The bovine tuberculosis eradication project has been handled throughout by men who were trained for the job they were undertaking. Its success has been phenomenal. In the matter of hog cholera, the attempt has been made to teach the livestock owner to handle the job of control. Bovine tuberculosis has been 90% conquered in a score of years, while in three decades the cost of hog cholera has not materially decreased and with some fluctuations from year to year, is now about what it was when anti-hog cholera serum was discovered. In this cost of hog cholera is included, of course, the cost of preventive measures.

Vaccination of Heifers Controls Abortion

All heifer calves in a herd of 43 cows, 13 of which were shedding *Br. abortus* in the milk, were vaccinated when five to eight months of age with a live vaccine prepared from strain 19.

Over a period of six years the number of animals shedding *Br. abortus* in the milk fell from 13 to 1, while the number of cows in the herd increased from 43 to 68 without additions from the outside.

In a herd free from brucellosis, efforts were made to detect any spread of the organism (strain 19) from vaccinated to invaccinated animals. No such spread could be observed.

Haring, C. M. Vaccinations of heifers and calves to control *Br. abortus* infection. *Proc of the 6th Pacific Sci. Cong.*, 5, pp. 293-97. 1939. Abst. in *Vet. Bul.*, 13:10, p. 349. 1943.

Talcum powder used on rubber gloves to prevent adhesion of surfaces during sterilization and to facilitate putting them on the surgeons hands has long been recognized as a hazard in abdominal surgery causing foreign body peritonitis, post-operative intraperitoneal adhesions and recurrent intestinal obstruction. That talc used on the surgeons gloves is frequently deposited in the abdominal cavity in laparotomies despite washing the gloves and other precautions was shown by an investigation that revealed residual talc in 80% of those who had undergone an operation in which the abdominal cavity was opened.

Seelig, Verda and Kidd[1] experimented with a large number of substances as substitutes for talcum powder in the sterilization and use of surgeons' gloves and found only one, potassium bitartrate (cream of tartar) that possesses all of the advantages and none of the disadvantages of talc.

[1] *Jnl. A. M. A.*, 123:15, pp. 950-54.

Experimental Transmission of Equine Infectious Anemia by Contact and Body Secretions and Excretions

By C. D. STEIN, V.M.D., O. L. OSTEEN, D.V.M., L. O. MOTT, D.V.M., and M. S. SHAHAN, D.V.M.*

ALTHOUGH considerable experimental evidence has been reported to indicate that infectious anemia may be transmitted by injection of infectious material, by insect vectors and by ingestion of contaminated material, the common method of its dissemination under natural conditions is still in doubt.

Review of Literature

Carré and Vallée,[1] Ostertag,[2] Van Es, Harris and Schalk,[3] Schlathölter,[4] Pierot[5] and Manninger,[6] who have transmitted the disease in some instances (usually by prolonged feeding of great amounts of infectious material), have advanced the theory that contamination is the principal factor concerned in natural transmission. These investigators believe that infection occurs principally by contact and the resulting ingestion of food and drink contaminated with virulent material, especially urine. According to Pierot,[5] drinking water plays a considerable role, if it is not the principal vehicle of contagion. Manninger,[6] who transmitted the disease by feeding defibrinated blood or urine from an acute case and by prolonged application to the unbroken skin of cotton bandages saturated with infective blood or urine, believes urine to be more virulent than blood.

In this connection it is interesting to note that Troitskit and Klimov[7] recently reported evidence indicating that infection *per os* depends on the length of time the virus is in contact with the gastric juice. They further reported that the virus *in vitro* is inactivated after exposure to the gastric juice for one hour, and believe that if it passes through the stomach undamaged, it is absorbed in the intestines and may thus set up the disease. They were able to transmit the disease to colts by the administration of citrated blood *per os* or by the introduction of virulent serum through an artificial fistula in the cecum.

On the other hand, many investigators, on account of the difficulty of transmitting the disease by contact or by feeding milk, blood, urine, saliva or feces from infected horses, are of the opinion that the disease has little or no tendency to spread among horses kept in stables under good hygienic conditions.

Because of the ease and certainty of transmission by subcutaneous administration of small amounts of virulent blood, these research workers believe that one of the most common methods of dissemination is by means of injection of the virus beneath the skin either by insects or by accident.

Carré and Vallée,[1] Francis and Marsteller,[8] Lührs,[9] Scott[10] and Heath[11] have all succeeded in transmitting the disease by the injection of very small amounts of virulent blood or serum. The Japanese Commission,[12] Scott[10] and Lührs,[9] as a result of extensive studies, concluded that blood-sucking insects play an important role in the dissemination of infectious anemia. Brimhall, Wesbrook and Bracken,[13] Ries,[14] Fröhner,[15] Halverson,[16] Howard,[17] Rodionov[18] and Zenkner,[19] while not denying the possibility of transmission by contaminated food and water, appear to favor the insect theory of transmission.

According to Kral, Macek and Sobra,[20] the virus is present in blood corpuscles and serum, in tissue protein and in urine, if it contains albumin. They believe that infection occurs through injured skin or mucous membrane, that infection by blood-sucking parasites is infrequent and that the disease does not spread readily among horses by contact.

The Japanese Commission,[12] Heath[11] and Gambarov[21] have reported evidence to indicate that the disease spreads only very slowly and with difficulty among animals

*Pathological Division, Bureau of Animal Industry, Agricultural Research Administration.

held for long periods in constant, intimate contact. Hempel,[22] Acres,[23] Swingle,[24] Schmidt,[25] Fröhner,[15] Francis and Marsteller,[8] Scott[10] and Goryachiv[26] failed to transmit the disease by contact exposure.

In early investigations reported elsewhere,[27] Bureau research workers transmitted the disease by the subcutaneous or intravenous injection of virulent material and with the stable fly (*Stomoxys calcitrans*). However, they were unable to transmit the disease by the injection of extracts prepared from gastrophilus larvae or other intestinal parasites obtained from infected horses; by feeding highly virulent blood serum or urine from a chronic case; or infective larvae of intestinal parasites from an acute case; by the bites of horse flies (*Tabanus lasiophthalmus* and *T. affinis*); or by contact exposure for long periods of time.

In recent experiments carried on by the Bureau[28, 29, 30, 31, 32, and 33] evidence was obtained to indicate that the disease may be transmitted (1) by subcutaneous, intradermic, intravenous or intracranial injection of small amounts of filtered virulent serum; (2) by the injection of a saline extract prepared from washed intestinal worms (*Strongylus*) or the contaminated mouth parts of horse flies collected from infected horses; (3) by the injection of milk from infected mares, and semen from an infected stallion; and (4) by the bites of horseflies, stable flies and mosquitoes that had previously fed on infected horses. The presence of the virus was also demonstrated in the intrauterine circulation of infected brood mares. On the other hand, transmission was not accomplished (1) by transfer of blood sucking lice (*Haematopinus asini*) from an acute case to a susceptible horse; (2) (a) by injection of saline extract of washed Cylicostomes (small strongyles), (b) a similar extract of washed bots (*Gastrophilus intestinalis* and *G. nasalis*) or (c) a saline extract of large numbers of third stage strongyle larvae from infected horses, and (3) by repeatedly feeding large numbers of washed third stage larvae of strongyles and cylicostomes obtained from feces of infected horses. The results of these studies appeared to indicate that the introduction of virus-containing material into or under the skin either by artificial means, by accident or by insect bites constitutes the easiest and probably the chief channel of infection. However, to obtain more information on this point the following described studies on transmission by contact and body secretions were carried out.

Materials and Methods

The strains of virus used in these experiments were obtained from horses experimentally infected with strains of virus originally isolated from field cases of infectious anemia in outbreaks occurring in New York, Mississippi, and Wyoming.

The susceptible horses used in these experiments were of the light type, 900 to 1100 pounds and, except where stated, were held under observation in screened isolation stables provided with concrete floors and screened vestibules. As far as can be determined, none of the normal horses had any previous contact with horses affected with infectious anemia. Temperatures on all test animals were taken and recorded at least twice daily. Special precautions were taken to exclude all possibilities of accidental transmission. The infected animals used in these experiments were horses or mules experimentally infected with known strains of virus and affected with the disease in the acute, subacute or chronic form.

Collection of Saliva and Urine.—The saliva from infected horses was collected as follows: About 10 minutes prior to the collection, each horse was given a hypodermic injection of 1.5 grains of pilocarpine hydrochloride, which produced a copious flow of saliva. The saliva was collected in sterile shallow pans and transferred to sterile flasks. A portion of the saliva thus collected was filtered by passing through a No. 8 Mandler filter and was then tested for sterility.

The urine used in these experiments was collected by three different methods: (1) by means of a sterile catheter, (2) by an attendant during periods of urination and (3) direct from the bladder of an acute fatal case during the post-mortem examination. All the urine samples were collected

in sterile flasks and a portion of one of the samples was filtered by passing through a No. 8 Mandler filter.

Contact Transmission Experiments

EXPERIMENT A:

Ordinary Stable Contact.—This experiment was conducted under about the same housing facilities that the average horse barn affords except that in some of the experiments the windows and doors were equipped with screens. Normal horses were kept in stalls adjacent to stalls occupied by acute and chronic cases of infectious anemia. All the test animals were fed from separate mangers and received drinking water from separate containers. Soiled straw, manure, and other refuse were removed from the stalls daily.

1. Three normal horses 850, 802 and 885 were placed in stalls adjacent to those occupied by horses affected with acute or chronic infectious anemia. Horse 850 after a period of five months, horse 802 after a period of seven months and horse 885 after a period of 14 months of such contact failed to develop symptoms of infectious anemia.

2. Normal horse 784 was held under observation for six months before being put in contact with infectious anemia horses. This horse was then placed in a poorly drained grass paddock with acute cases of the disease for a period of two weeks and subsequently stabled for six months in a stall adjoining one occupied by an acute case, but failed to develop symptoms of infectious anemia. The four normal contact horses 850, 802, 885 and 784 used in these experiments, when exposed to active virus by subcutaneous inoculation, all developed the disease in the acute form after a short incubation period.

EXPERIMENT B:

Semi-intimate Stable Contact.—Two normal horses 750 and 751, held for 16 months under observation before having any contact with infectious anemia horses, were placed in the same stable with affected horses in all stages of the disease under what we described as semi-intimate contact (that is, at times eating and drinking out of the same containers

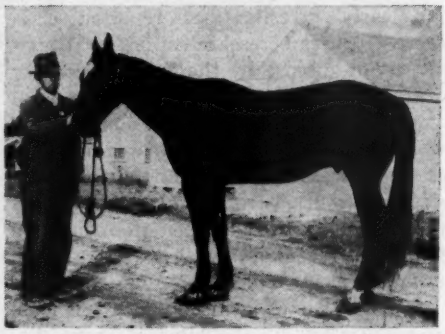


Fig. 3. Horse 900—Early stage of the disease. Infected after 190 days of continuous intimate stable contact with acute and chronic cases of infectious anemia. Clinical symptoms (high temperature, sluggishness and inappetence)

as the infected horses and occupying stalls that had been used for holding infected horses.) After six months of such contact exposure, both animals failed to contract the disease but, when exposed by subcutaneous inoculation to an active virus, they developed the disease promptly in the acute form.

EXPERIMENT C:

Intimate Stable Contact. — Two normal horses 900 and 910 that had been isolated and held under observation for a period of two months and one normal mule 902 were placed in a large stable with 11 infected animals (horses and mules) affected with all types of infectious anemia. This stable contained no stalls and animals were allowed free range. The drinking water was supplied from a common watering trough, grain was

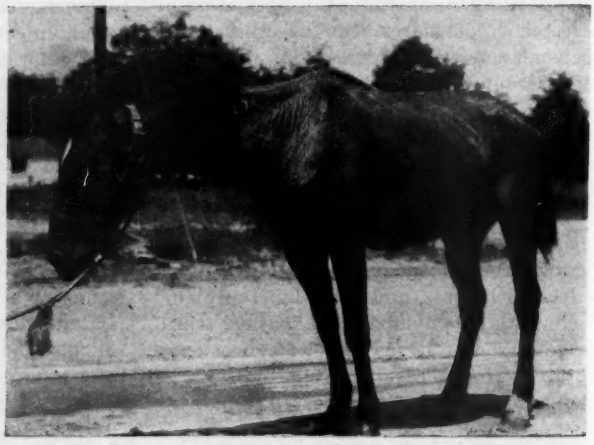


Fig. 4. Horse 900—Late stage of the chronic form of the disease with progressive anemia (10 months subsequent to first symptoms of infection and five days prior to death). Red cell count 1,875,000. Compare with Fig. 3 and note poor condition, tucked up flank and edema of prepuce. Animal showed great depression and was extremely weak. Tail has been bobbed by attendant

fed from a common trough placed on the floor and hay was fed direct from the floor on which feces, urine, soiled straw and refuse from animals were allowed to accumulate during the entire test period. All the openings in the stable were screened to exclude flies and mosquitoes and the entrance was equipped with a double screened vestibule. However, in spite of these precautions, a few flies were present in the stable at different times during the course of the experiment. Figs. 1 and 2.

Horse 900 after 190 days of such contact exposure developed typical symptoms of the disease, which ran a chronic course and 10 months after the appearance of the initial symptoms, resulted in death. During the course of the disease this horse had 22 intermittent febrile reactions and developed a progressive anemia, the red cell count decreasing from 8,800,000 to 1,875,000. Figs. 3 and 4.

Horse 910 after 249 days' contact and mule 902 after 236 days' contact failed to develop symptoms of infectious anemia but both of these animals, when injected subcutaneously with an active strain of virus, developed an acute fatal form of the disease.

The results of these experiments indicate that the infection spreads slowly and with difficulty by contact exposure.

Transmission Experiments with Saliva and Urine

Experiment 1.—November 3, 1936, normal horse 976 was injected subcutaneously with 50cc of filtered saliva, collected on October 30, 1936, from horse 946 affected with chronic infectious anemia. No symptoms of infectious anemia developed in horse 976 during a period of seven months, however, when it was injected with 50cc of virulent blood No. 999, it developed symptoms of acute infectious anemia on the 8th and died on the 15th day following exposure.

Experiment 2.—November 3, 1936, 1,000cc of unfiltered saliva collected on October 30, 1936, from infected horse 946 was administered in the drinking water to normal horse 969. No symptoms of infectious anemia developed in horse 969 during a period of seven months but when injected with 50cc of virulent blood No. 999, it developed, in 10 days, symptoms of the disease which ran a chronic course.

Experiment 3.—July 31, 1942, normal horse 1126 was injected subcutaneously with 120cc of filtered saliva, collected on July 29, 1942, from horse 1295 affected with subacute infectious anemia. Aside from a slight temperature reaction (101.4°F.) that occurred on the 20th day, no symptoms of infectious anemia developed in horse 1126 during a period of 73 days but, when injected subcutaneously with 10cc of virulent blood from horse 1295 (the same source as the saliva), it developed symptoms of acute infectious anemia in 17 days.

In these three experiments the disease was not transmitted to susceptible horses by the subcutaneous injection of filtered saliva from a subacute or chronic case or by the oral administration of unfiltered saliva from a chronic case.

Experiment 4.—November 3, 1936, normal horse 983 was injected subcutaneously with 50cc of filtered urine collected October 30, 1936, from horse 946 affected with chronic infectious anemia. No symptoms of infectious anemia developed in horse 983 during a period of 205 days.

Horse 983, however, when injected subcutaneously with 50cc of virulent blood No. 999, developed symptoms of the disease on the 6th day and died of an acute attack 15 days following exposure.

Experiment 5.—November 3, 1936, 1,000cc of unfiltered urine, collected October 30, 1936, from infected horse 946, was administered in the drinking water to normal horse 978. Aside from a temperature of 102°F., that occurred on the 4th day and persisted for only one day, no symptoms of infectious anemia developed in horse 978 for a period of four months. January 21, 1937, 50cc of blood was collected from horse 978 and injected into normal horse 980 to test for infectivity. Horse 980 remained normal for a period of five months, indicating that the blood of horse 978 was non-virulent and that the animal had not become infected by ingestion of urine from infected horse 946.

Experiment 6.—July 31, 1942, normal horse 1231 was injected subcutaneously with 120cc of unfiltered urine, collected from horse 1295 affected with subacute infectious anemia. Horse 1231 developed an abscess at the site of injection and showed a rise in temperature of 102.6°F. on the third day, but otherwise no symptoms indicative of infectious anemia occurred during a period of three months. However, when injected with 10cc of virulent blood from horse 1295 (the same source as the urine) it developed symptoms of acute infectious anemia in 13 days.

Experiment 7.—July 22, 1940, 1,500cc of unfiltered urine collected during autopsy of horse 1206 (an acute case of infectious anemia) was administered by stomach tube into pharynx of normal horse 1215. To insure intensive contact of the urine with the mucosa, the stomach tube was slowly withdrawn toward the pharynx as the urine was poured down the tube. Horse 1215 showed a slight rise in temperature (101°F.) and was off feed for a few days during a heat wave. Aside from this no typical symptoms of infectious anemia developed in this horse during a period of three months but, when injected with 50cc of blood from infectious anemia carrier horse 884, it developed typical

symptoms of the disease on the 23rd and died on the 48th day following exposure.

In the last four experiments the disease was not transmitted to susceptible horses by the subcutaneous injection of filtered or unfiltered urine or oral administration of urine collected from infected horses.

Discussion

In these studies no transmission of the disease occurred by ordinary stable contact during an exposure period of 5 to 14 months, nor by semi-intimate stable exposure for a period of six months. Evidence was obtained to indicate that its spread was slow and limited even with the most intimate type of contact exposure, since only one of three animals contracted the disease under such exposure in more than six months.

Neither in these studies nor in our early experiments could transmission be effected by feeding blood, urine or saliva from infected to normal susceptible horses. In this connection it is interesting to note that Ostertag[2] and Gubin[34] failed to transmit the disease with saliva from infected horses.

On the other hand, in recent studies[31, 32, 33] it was shown that the easiest and most certain method of transmitting the disease is by means of injecting virulent material such as blood, serum, milk or semen from infected animals.

It was demonstrated that subcutaneous injection of minute amounts of filtered virulent serum (dilution of 1 to 1000) or repeated pricking of the skin with an infected hypodermic needle is sufficient to set up an acute, fatal case. Likewise the disease is readily transmitted to susceptible horses by the bites of horse flies and stable flies that have fed on infected animals.

On the basis of experimental results obtained in these studies and in previous transmission experiments, it appears probable that injection of the virus into or under the skin, either by the bites of insects or by other similar means or contamination of abrasions of the skin or mucous membrane with infectious material, constitutes one of the chief methods of dissemination of the disease. However, the possibility of intrauterine transmission and infection *per os* cannot be ignored.

In view of the foregoing facts, the following recommendations seem warranted:

1. Flies and mosquitoes should be controlled.

2. The greatest care should always be taken to prevent transmission of the disease by the use of unsterilized instruments —particularly bleeding needles and hypodermic needles.

3. The common practice of interchang-

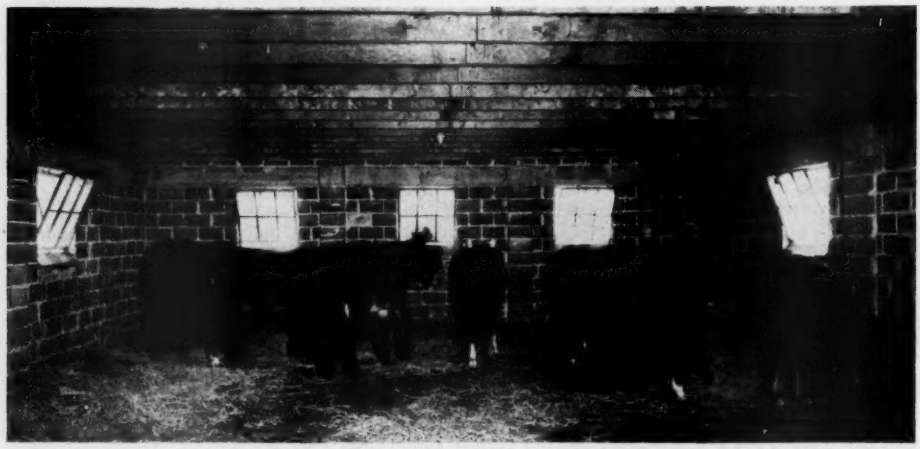


Fig. 2. View of the interior of building used for housing animals used in intimate contact transmission experiment. No stalls. Showing how susceptible animals were allowed free range with those affected with acute or chronic infectious anemia. Manure, urine and soiled bedding not removed from building during course of experiment but allowed to accumulate to a depth of several inches. Animals received feed and water from common feed and watering troughs

ing equipment (such as bridles, harness, brushes and curry combs) that may produce skin abrasions on both infected and healthy horses is probably dangerous and should be avoided.

4. Only horses known to be free from infectious anemia should be used as donors for blood transfusions.

5. Mares suspected of being affected with infectious anemia and clinically recovered carriers should not be used for breeding purposes.

6. All anti-sera prepared from horses and intended for treatment of equidae or man should be so heated or chemically treated as to destroy the virus of infectious anemia —this is now required of licensed biological houses in the United States.

7. Horses known to be affected with the disease should be isolated from healthy animals or, preferably, destroyed.

8. Good sanitary conditions should be maintained, intestinal parasites systematically controlled and provision made for a supply of pure, fresh water.

Summary and Conclusions

1. The literature, including early and recent studies by Bureau investigators on transmission of infectious anemia, is briefly reviewed.

2. One of three susceptible equines, after 190 days of continuous, intimate exposure to horses and mules affected with infectious anemia, acquired the disease. Under identical circumstances the other two animals failed to contract the disease during contact periods of 236 and 249 days respectively.

3. Four susceptible horses, held from 5 to 14 months in separate stalls in the same stable as horses affected with infectious anemia, and two susceptible horses held for six months with infected horses in close or semi-intimate contact, remained unaffected.

4. Transmission of the disease to susceptible horses was effected neither by oral administration of unfiltered urine or unfiltered saliva, nor by subcutaneous injection of filtered or unfiltered urine or filtered saliva collected from horses affected with infectious anemia.

5. On the basis of experimental results obtained in these studies, it is concluded that infectious anemia spreads slowly and with difficulty by contact exposure and that the principal mode of dissemination is probably by injection of infectious material into or under the skin either by biting flies, or similar means or by contamination of abrasions on the skin or mucous membrane with infectious material and not by ingestion of infectious material.

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Fig. 1. View of building used for housing animals during intimate contact transmission experiment. Constructed of concrete blocks with concrete floor. All windows and doors well screened against insects. Building well isolated from other barns used for holding experimental animals

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Swine Erysipelas*

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SWINE erysipelas is a comparatively new disease in which veterinarians and swine producers have recently shown a greatly increased interest. Some veterinarians may ask, "Does this disease deserve the attention which is being given to it?", "Is this malady a menace to the swine industry?", and many similar questions, the answers to which can be determined only by carefully analyzing the true situation.

Sufficient evidence has been accumulated to show that many of our swine herds have been, and still are being, damaged by a distinct infection. In many respects this infection is unlike hog cholera or other commonly known infections of swine. Whether called swine erysipelas or by any other name, it warrants serious consideration.

History

Swine erysipelas has been recognized as a distinct disease in Europe for many years. In the United States, during the early days of meat inspection, the first form in which it was recognized was diamond-skin disease. Later, about 1921, the *Erysipelothrix rhusiopathiae* bacilli were isolated from swine tissues in laboratories. About 1930 the disease was diagnosed clinically on a farm in South Dakota. Since that time it has been found in many other states. As a newly recognized malady of swine, it soon became the leading topic wherever swine diseases were discussed.

Cause

In the United States, the specific organism found in swine erysipelas is the *Erysipelothrix rhusiopathiae* bacillus. However, the belief is generally accepted that in addition to the organism itself, some unknown factor is necessary to produce the infection, since it is difficult to reproduce characteristic symptoms of the disease with any regularity by injecting *E. rhusiopathiae* culture into swine. Experiments of this nature have been made on only a limited scale. It is possible that the pigs selected for the experiment had acquired a natural immunity without showing effects of the disease. It is probable that erysipelas may be produced with regularity by injecting cultures of the organisms into known susceptible pigs. In a few cases the disease has been produced on farms by the injection of serum and culture. Without further experiments, we cannot entirely accept the statement that the injection of *E. rhusiopathiae* does not produce the disease.

Spread

The manner in which erysipelas is spread is not always known. The infection may be introduced into the herd by the purchase of infected breeding stock. Many cases of erysipelas have been observed following the purchase of an infected boar. Veterinarians can render a valuable service to prospective buyers of boars by a searching examination of the animals for symptoms or lesions of erysipelas. It is not advisable to buy any breeding animal that shows even slight symptoms of lameness, arthritis, skin sloughing or the absence of even a small part of the ear or tail. If the boar is underweight, he should be classed a suspect. There are other means of spreading the infection which cannot be controlled, such as wind and dust, or animals dragging a piece of infected material onto the farm.

Seasonal Occurrence

Acute swine erysipelas, like many other diseases, is more or less seasonal. It is more prevalent during the spring months, subsides during the hot months and appears again in the fall. It has been observed during every month of the year.

The infection very commonly occurs in sows, either immediately before farrowing, or at any time during the suckling period. It is more likely to occur soon after farrowing than later. It is seen quite often in suckling spring pigs, also in fall pigs which are kept on the farm until spring. Many spring pigs which escape the infection dur-

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ing the spring and summer develop the disease in the fall. This seasonal occurrence is a useful guide in diagnosis.

Class of Hogs Affected

Swine of all ages are susceptible to the disease, from suckling pigs to adult animals. It is just as likely to appear first in the sows or shotes as in the suckling pigs. The infection may spread from one group

Age makes no difference in susceptibility of swine to erysipelas—it occurs in suckling pigs and in adult animals

to another or it may be confined to the group in which it first appeared. However, should the sows be affected first the litter usually becomes infected also.

This tendency to be confined to certain age groups usually gives one a lead in diagnosing erysipelas. At least, it aids in eliminating certain other diseases. For example, in an acute ailment of suckling pigs from cholera immune sows, one should not suspect hog cholera. Neither do pigs of this age often show the effects of *Salmonella choleraesuis*. Pigs around or soon after weaning age are more susceptible to salmonellosis than any other class of hogs. Where adult animals show symptoms of acute sickness, one should first suspect hog cholera, and secondly erysipelas.

Recurrence of the Disease

Once a farm is infected the disease may recur in subsequent years. While there is no way of predicting the reappearance of the disease with any degree of exactness, the infection can reasonably be expected to occur with regularity each year on approximately 15% of the infected farms. On some farms, the disease appears intermittently; on others, it may not appear again for several years. Following an acute attack of the disease on a farm, there are usually some signs of a low grade infection in each crop of pigs for several successive years. The symptoms may be of such a slight nature that they are easily overlooked.

Morbidity and Mortality

The morbidity in acute infections ranges from 1 to 100%. Usually a large percentage of the sick animals survive. The mortality based on the morbidity ranges from nil to approximately 50%. Here again may be an index to the disease—the mortality. If all the sick animals succumb to a malady in a herd of a considerable size, swine erysipelas should not be suspected.

Damage

There is always some damage inflicted upon a herd affected with erysipelas. The amount varies considerably. If only a few animals are affected and recover, the loss may be slight. If a large percentage are visibly sick, even though the mortality be low, the herd is severely damaged. The major economic loss from erysipelas is not due to the number that die but to the unthriftiness of the pigs that live and require a longer feeding period for marketing. This kind of damage may not always be apparent to the untrained observer.

Symptoms

Swine erysipelas occurs in both acute and chronic forms. The ante-mortem symptoms in the acute form are:

1. The acute sickness in the herd is usually of short duration, from one to four days.
2. Sudden deaths usually precede an acute herd attack.
3. Several animals in the herd sicken at the onset of the disease.
4. Sick animals recover within two or three days.
5. The infection reaches a crisis quickly.
6. There is a progressive type also, in which one or two hogs die at intervals.
7. Skin discolorations are scarlet red and slightly edematous.
8. Soreness and stiffness are often present.
9. Lameness, most pronounced in heavy hogs.
10. Whooping cough with vomiting sometimes occurs.
11. The appetite is usually fair.
12. Some animals may show plenty of vitality when aroused, others may not.
13. The eyes are usually normal.
14. Diamond-skin lesions may be present.
15. The temperatures rise quickly to around 108° F. and subside rapidly.

In acute erysipelas the post-mortem lesions are:

1. The lymph nodes may or may not be congested.
2. Petechiae may be found on the epiglottis, lungs, stomach, kidneys, and bladder in approximately 50% of the cases.
3. The mucous surface of the stomach may be highly inflamed, showing a dark bluish-red color.
4. The kidneys may show nephritis and petechiae, or may be normal.
5. The heart may show some hemorrhages.
6. The small intestines are usually normal, but may show some inflammation.
7. The large intestines are usually normal, but may show a bluish-red discoloration on the mucosa.
8. The spleen is always involved, showing enlargement and a solid discoloration. The size and the intensity of color may vary considerably. A typical erysipelas spleen is bluish-red.
9. Pulmonary lesions and diarrhea are rarely observed.

The ante-mortem symptoms in the chronic form are these:

Joint lesions of erysipelas

1. Arthritis and enlargements around the joints.
2. Skin sloughing on any part of the body, more often seen over the withers.
3. Sloughing of parts of the ears and tail.
4. Stunted pigs, characterized by shrunken bodies and development of the ears and legs. They are commonly called race horse pigs.
5. The hair may be thin over the entire body or only in patches.
6. Hard dry patches of skin over the back, which are difficult to observe, but can be detected by rubbing the hand over the surface.

In chronic erysipelas post-mortem lesions are usually absent. Practically all internal organs are normal in appearance, but cauliflower growths and serum clots in the heart are seen occasionally and are considered rather typical of the disease. Diagnosis of erysipelas in the chronic form is usually made from ante-mortem symptoms.

Diagnosis

In diagnosing any swine sickness, it is necessary first to determine whether the disease is that of an individual hog or of the herd, whether it is infectious or non-infectious. Then a basis will have been established upon which to proceed. In order to make a correct diagnosis of acute swine erysipelas, one must be familiar with the history and symptoms and the ante-mortem and post-mortem lesions of all known infections of swine. The elimination of hog cholera and other known infectious diseases of swine is imperative. Pathognomonic symptoms are not always present and without them a positive diagnosis of swine erysipelas cannot be made.

If it is established that the disease is not hog cholera, suipestifer, or any other known infection, and the history, symptoms, and lesions all point toward erysipelas, one is justified in calling it erysipelas. Certain histories and symptoms are very characteristic of swine erysipelas. They have already been described. One should familiarize himself with them and use them. A diagnosis of erysipelas made without sufficient evidence of the disease is merely guess work.

Differential Diagnosis

The common swine diseases which are often mistaken for swine erysipelas are hog cholera, skin sloughing due to allergies which sensitize the white skin to sunlight, fractured bones especially in large hogs, acute salmonellosis in shotes, actinomyces necrophorus, and Corynebacterium pyogenes infections in suckling pigs. The history in hog cholera is usually the opposite of erysipelas:

1. The acute sickness in the herd is progressive.
2. Sudden deaths rarely occur.
3. Only one or two animals in the herd sicken at the onset of the disease.
4. None of the sick animals recover, but gradually get worse and develop pneumonias.
5. The infection reaches a crisis gradually.
6. The number that sicken increases daily until the whole herd is affected.
7. The skin discolorations are purplish-red.
8. Soreness and stiffness rarely occur.
9. Lameness is not associated with hog cholera.
10. Hacking or rattling cough may be present.

11. Animals are entirely off feed except in the initial stage.
12. Emaciation and extreme exhaustion are evident.
13. Eyes are usually gummy.
14. Diamond-skin lesions are not present.
15. Temperatures usually rise gradually to around 106° F., the sick animals becoming weaker each day.
16. The lymph nodes are usually a darker red than in erysipelas.
17. The spleen in uncomplicated hog cholera is usually normal in size and color; purple hemorrhages on a spleen, normal in size and color, are characteristic of hog cholera.

Skin sloughing is usually superficial when due to an allergy sensitising the white skin to sunlight. The deeper skin structures are usually involved in erysipelas. The *E. rhusiopathiae* do not prefer any particular color. When the skin is affected with erysipelas in mixed colored hogs, all colors are affected. In solid white hogs, it is more difficult to determine where to draw a line between skin erysipelas and allergic skin irritations. The character of the lesions, that is, whether they are superficial or deep seated should be a guide.

Fractured bones, which may be confused with erysipelas, usually occur on the upper third of the femur. They may be difficult to detect because of the heavy musculature in that region. Fractures usually occur in sows suckling large litters, but may occur in other large hogs which are deficient in calcium and phosphorus. The animals get down, seem to be partially paralyzed and show evidence of pain when disturbed. The differential diagnosis would be a normal temperature, good appetite, crepitation and no evidence of erysipelas. A definite diagnosis of a fracture can be made by a postmortem examination.

Acute salmonellosis (suipestifer infection) is probably the most difficult disease to differentiate from erysipelas. It occurs more frequently in shotes at weaning age. The disease is characterized by sudden deaths, the temperature rising rapidly to 108° F. or higher, the sick pigs are lively, the eyes clear, and the appetite is fair. The spleen is usually dark and swollen and gastritis is often present. The lymph nodes may be congested. As will be noted, these are exactly the same symptoms and lesions observed in swine erysipelas. However, the history of sudden deaths is usually different from erysipelas. Several animals may die suddenly, one every day or two, over a period of one or two weeks. Preceeding an acute herd attack of erysipelas, sudden death occurs usually in only one animal. The spleen, upon exposure to air for a few moments, assumes a reddish cast in salmonellosis while in erysipelas the characteristic bluish-red color becomes more pronounced.

After the herd has been affected with salmonellosis a few days, some of the sick pigs will probably survive. These will begin to show typical symptoms of necrotic enteritis, such as emaciation and diarrhea.

Actinomyces necrophorus and *Corynebacterium pyogenes* infections are seen more frequently in suckling pigs. They are both classed as filthy hog-lot diseases. Necrophorus infection may become a generalized toxemia and produce a dry scaly skin or a moist cracking of the skin which is often mistaken for erysipelas. Other lesions are usually present in the herd, such as rhinitis, necrotic ulcers on the lips and other parts of the mouth and face, which would be sufficient evidence to eliminate erysipelas. *C. pyogenes* infection occurring in suckling pigs frequently causes swollen joints, which may be confused with erysipelas. The joints, however, are soft and may contain pus. Enlarged joints caused by the erysipelas organism are usually hard and do not contain pus.

Due to the sudden onset of the disease, many animals become sick at one time and swine erysipelas is often diagnosed as some kind of poisoning. The elevated temperatures of erysipelas contrasted with the subnormal temperatures in poisoning should be sufficient evidence to differentiate between the two.

Arthritis in hogs may be caused by several infections, also by deficiencies. Not every pig showing an enlarged joint should be considered a victim of swine erysipelas. However, approximately 80% or more of such cases are probably due to the swine erysipelas organism. Enlarged joints due to the swine erysipelas bacilli usually occur in pigs after they are five to six weeks of age.

Arthritis in pigs under this age is more frequently due to some other cause. The pain evidenced in erysipelas arthritis is usually more severe than in arthritis due to other causes. Where several joints are involved, the affected animal's body has a tendency to shrink while the legs, head and ears seem to continue to develop, the pig assuming the race horse appearance referred to under chronic erysipelas symptoms. In rickets, if enlarged joints are present, the legs are likely to be bowed.

A differential diagnosis of tail sloughing may be made by considering the period of the pig's life in which the sloughing occurred. Tail sloughing caused by erysipelas usually occurs any time after the pigs are four to six weeks of age. Tail sloughing, prior to this age, is more likely to be due to undetermined causes, since the injection of erysipelas serum alone has failed to prevent such occurrences.

It is not unusual to observe ear, tail and skin sloughing following a spell of severe cold weather. The owner may be convinced that the lesions are due to freezing, but they are typical of swine erysipelas and may occur in either hot or cold weather. Almost any ear lesion may be suspected as a symptom of erysipelas. Edematous ears, curled ears, superficial skin sloughing, etc., are seen in some herds affected with erysipelas; however, unless other lesions more characteristic are apparent, a positive diagnosis of erysipelas is not warranted.

A typical erysipelas ear is one in which a portion of the ear shows a dry, gangrenous condition and a distinct line of demarcation. If this part of the ear has already dropped off, the remaining part appears to have been cut off on a straight line. The distinguishing lesions are these: The sloughed edge shows a light color and is denuded of hair if erysipelas is a factor. On a cut ear, there is no light color and the hair overlaps the edge.

Case Reports

This is a typical case of acute swine erysipelas in a herd of 60 head of hogs. The owner finds one dead hog which was never noticeably sick. A few days later, two more hogs die quickly and ten more are visibly sick—showing symptoms of pain when aroused. They are so stiff in their front legs it is difficult for them to walk. Some cannot be made to rise. The temperatures are 108 to 108.4° F., the eyes are clear and the feces normal. Other hogs, which apparently are not sick, have temperatures of 108° F. also.

Urticarial form of swine erysipelas showing parts of the ears sloughed away

Post-mortem examination reveals congested lymph nodes, petechiae on epiglottis, kidneys, diffuse nephritis, paint-brush smear on stomach and an extensive inflammation of mucosa of stomach which is a bluish-red. The whole spleen is enlarged and swollen and shows a dark bluish-red color that does not change on exposure to the air.

Hog cholera is diagnosed, the herd is treated with hog cholera serum and virus. Only three more hogs die. The herd is observed about four four weeks later and ten cases of severe arthritis are seen. Two more animals have sloughing of parts of the skin and ears. Had the herd been treated with erysipelas serum, it could reasonbly be expected that no more hogs would have died

and fewer cases of arthritis would have developed.

Picture another case:

Last spring an owner had 16 sows farrow approximately 100 pigs. About three weeks later the pigs began to die, although the sows remained well. For four months death losses continued at intervals among the pigs. There are now about 40 pigs left, of which 15 are badly crippled with arthritis. The other 25 are stunted. The best pigs weigh about 100 pounds. They are nearly five months old and should weigh close to 200 pounds. No treatment of any kind was used on this herd.

The foregoing represent two types of erysipelas. First the explosive type, and second, the progressive type. From these pictures, can one conclude other than that erysipelas damages our swine herds?

Laboratory Specimens

In many cases, laboratory findings of tissue specimens taken from erysipelas infected herds have been negative. Failure to find the bacilli may be due to selecting the wrong animal to autopsy. To isolate the swine erysipelas organism, specimens should be taken from a hog that is acutely sick, preferably one that shows a high temperature and has been sick only a short time. Send in the spleen, the unopened heart, kidney, affected joints, and other affected internal organs. Sprinkle all organs liberally with borax.

Although the laboratory findings may be positive for erysipelas, the fact that both hog cholera and erysipelas may exist in the herd at the same time must not be overlooked.

Treatment

At present there is no drug or combination of drugs recognized as an effective treatment for swine erysipelas. Most of you are familiar with the serum-alone treatment. It has been used extensively in treating sick herds and the response is generally satisfactory. However, serum produces only a passive immunity—effective for about two weeks. After this period there are many instances where the disease appeared again, necessitating repeated treatment. On some farms it has been necessary to administer serum as many as six times to the same hogs. Therefore, serum-alone is largely a therapeutic agent. It is not a satisfactory method of controlling or preventing erysipelas.

Serum and Culture Method

In an experimental attempt to produce an active immunity in healthy swine on infected farms, over four million hogs have been vaccinated with anti-erysipelas serum and a virulent culture. The results to date have been very satisfactory. Two methods of using the culture have been tried. First, one injection each of serum and culture, second, one injection each of serum and culture followed by a double dose of culture alone in 14 days. Our observations indicate that neither method has an advantage over the other.

Eight states are now participating in the swine erysipelas control work, Nebraska, Iowa, South Dakota, Missouri, Illinois, Kentucky, North Dakota and Nevada.

Swine of any age may be treated successfully. It appears, however, that the most practical procedure is to vaccinate pigs at from two to three weeks of age. On premises where the disease has occurred in pigs younger than three weeks of age, it is advisable to vaccinate when the pigs are two to three days old.

The injections are generally made in the axillary space on the pigs and behind the ears on adult hogs. The dosage of the culture that has proved satisfactory is from ¼cc for suckling pigs to 1cc for adult hogs. The dosage of serum is from 5cc to 20cc.

Our observations indicate that: (1) Serum and culture can be used safely on herds which contain acutely affected animals. (2) On badly infected farms, vaccination should be practiced with regularity on all hogs. The most favorable results are apparent after several successive years of vaccinating all hogs. (3) In herds affected with a low grade chronic form of the disease, vaccination with serum and culture is sometimes beneficial. Its use in such conditions is warranted. However, such herds may already be damaged beyond repair. (4) The serum culture treatment is the best known method of preventing the recurrence of swine erysipelas on infected farms.

Treatment of Canine Coccidiosis

By B. S. PARKIN*
Onderstepoort, S. Africa

IN THE Pretoria district coccidia are occasionally found during the course of the routine examination for worm eggs of the feces of dogs, which do not show symptoms indicative of coccidiosis. Clinical cases of coccidiosis are apparently of infrequent occurrence in this area. But recently a number of such cases have been encountered and, as these cases have been successfully treated, it is considered advisable to place the results on record, so as to enable veterinarians in the Union and elsewhere to undertake proper trials of the treatment. This is the more advisable because no efficacious therapy has hitherto been introduced. A brief description of the disease will be included.

In the dog, four species of coccidia have been described. Three of them belong to the genus *Isospora* and one, which is rare, to the genus *Eimeria*. In *Isospora* there are two spores, each containing four sporozoites, whereas in the *Eimeria* there are four spores, each with two sporozoites. The genera are identified by the development observed in the oöcysts when these are maintained under favorable conditions.

The infective stage of the parasites is the sporulated oöcyst which generally develops outside the animal's body after the oöcyst has been evacuated with the feces. Dogs are infected by the ingestion of the sporulated oöcyst. The sporozoites are liberated from the cyst into the lumen of the intestine and penetrate into the epithelium, where development continues. Merozoites result which are capable of asexual development. Ultimately some of the merozoites develop into micro- and macro-gametocytes forming the sexual stage and resulting in the production of the oöcysts.

The three species of *Isospora* found in the dog are: *I. bigemina*, which is the smallest, *I. rivolta*, and *I. felis*, which is the largest. The differentiation of the species is based on the size of the oöcyst.

In general the coccidia show a definite host-specificity, but the cat is susceptible to *I. felis* and *I. rivolta* of the dog. The ingestion of small doses of coccidia may result in the development of an immunity, which however, is specific only against the particular species of coccidium concerned. The greater resistance to coccidiosis sometimes observed in older animals is probably due to the previous development of immunity by the ingestion of sporulated oöcysts insufficient in number to produce clinical symptoms of the disease.

The sporulated oöcyst, the infective stage, is extremely resistant to the action of chemicals and it is a waste of time to disinfect kennels for the purpose of destroying them. They are, however, detrimentally affected by desiccation, putrefaction, and high temperatures. Consequently, dry or moist heat, drying, fermentation of feces and litter, etc., are utilized in the decontamination of quarters. Measures such as the destruction of infected animals or their isolation, rotation of accommodation, early disposal of feces, etc., are applied in the elimination of the source of infection, i.e., the feces of the animal. The destruction of the source by the sterilization of the infected animal with drugs is a method of control of primary importance, requiring only the discovery of efficacious therapy.

In severe forms of canine coccidiosis the symptoms are marked depression, lassitude and weakness, reduced or capricious appetite, profuse diarrhea with offensive, watery and, at times, blood-stained evacuation and rapid loss of condition.

In all the clinical cases referred to hereafter, the occurrence of coccidia in large numbers in the feces and the above mentioned symptoms (with the occasional exception of blood in the feces) were in evidence. The flotation method of examination of the feces was used. Glycerine was mixed with the fecal emulsion in equal amounts. The preparations thus obtained in 50% glycerine may be subjected to prolonged examination as they do not dry up. The development of the two spores was fre-

*Jnl. South African Vet. Med. Assn., 14:2, pp. 73-76, 1943.

quently seen in such preparations, especially when they were maintained at 44° C. (111° F.).

A very impressive list could be compiled of the drugs which have been used in the treatment of coccidiosis of the dog. Among these there is no drug which has any defi-

Before treatment the Scottish terrier showed inappetence, loss of condition and diarrhea

nite specific action against the parasite. Sulfaguanidine, one of the most recently tried, proved ineffective.

In the following description of the trials in therapy, three cases are recorded to illustrate the changes made in the treatment from the first to the third case, when the treatment was considered to be established and highly efficacious.

Case 1.—A six months' old cocker spaniel weighing 6.5kg had a history of diarrhea over the previous two months. It showed marked depression and emaciation and its appetite was capricious. Fecal examination gave a diagnosis of *I. bigemina* very frequent, and *I. felis* rare. It was given an enema of 0.5gm of sodium sulphanilyl sulphanilate (S.S.S.) and 2gm kaolin in 50cc of water (i.e., about 7.7cc of 1% solution of S.S.S. per kilo) and in addition 0.75gm of uleron (4-(4 amino-benzol-sulphonamido) benzol-sulphon-dimethyl-amide *per os*. For the next three days it was given a daily dose of 0.75gm of uleron. Within 48 hours the diarrhea had ceased and a marked general improvement was evident. No oöcysts were detected in the feces in the four fecal examinations made between the 7th and the 19th days after the commencement of the treatment.

Case 2.—Fecal examination of a two-year-old, Dobermann Pinscher of an estimated weight of 15kg showed *I. bigemina* to be very frequent. The dog was in poor condition, very depressed, not feeding and had diarrhea. It was given an enema of 1gm of S.S.S. and 2gm of kaolin in 100cc of water. This enema was repeated after 24 hours. In addition, 1gm of uleron was given daily *per os* for three days and 2gm of kaolin was fed to the dog daily for 10 days. Improvement was noticeable within 24 hours, and recovery was uneventful. Fecal examinations on the 8th day and after three months gave negative results for oöcysts. In this case the S.S.S. was given at the rate of about 6.6cc of a 1% solution per kilo. (The diagnosis and treatment of this case was by H. O. Monnig.)

Case 3.—The feces of a four-year-old Scottish terrier weighing 9kg showed *I. bigemina* to be very frequent and *I. felis* rare. The dog, while under observation for three days before treatment was instituted, showed inappetence, rapid loss of condition and diarrhea. It was given daily for three days, an enema of 50cc of 2% solution of S.S.S. (i.e., about 5.5cc of a 2% solution per kilo) and on the third day of treatment 0.75gm uleron. Fecal examinations made on the three days of treatment were positive, but one made on the second day after cessation of treatment was negative.

Discussion

The number of enemas given in these cases were: 1, one; 2, two, and 3, three. The oral administration of uleron was: in case 1 for 4 days, in case 2, for 3 days and in case 3 on one day. As the fecal examination in all three cases became negative for oöcysts within a few days after the commencement of treatment, it would appear that the efficacy was due to the enemas of S.S.S. and not to the uleron given *per os*. The inclusion of uleron may possibly have been a useful adjuvant, but the dose given in case 3 was so small that it is unlikely that the course of the disease was influenced by it.

The earliest negative fecal examination was obtained at the end of the 4th day. It is possible that the first of the enemas given was the one that produced the beneficial results and that the oöcysts found subsequent to the initial treatment were produced before the institution of the treatment and were retained in the intestinal lumen.

Kaolin was originally added in the belief that it would assist in the longer retention of the enema but in case 3, in which no kaolin was given, the enemas were satisfactorily retained.

The actual bulk of the enema is also

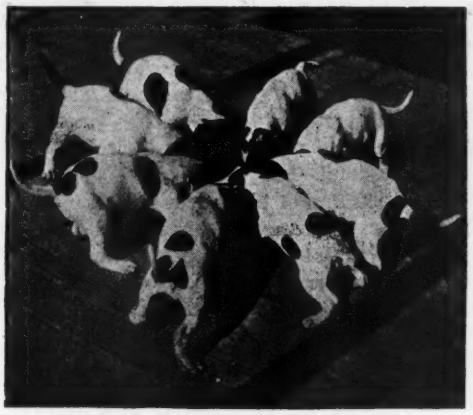
probably of importance in the treatment for it must be sufficiently large to reach the duodenum. In none of the cases was vomiting produced, the largest enema being at the rate of 7.7cc per kilo. Probably it would be unsatisfactory from the therapeutical point of view for the enema to be so large that vomiting or expulsion *per anum* resulted.

The number of cases treated is insufficient to determine the minimal effective dose of S.S.S. The largest dose of S.S.S. given at one time was 1.1gm per 10 kilos of live weight and the smallest about 0.6gm per 10 kilos. Probably the dose could, with safety but unnecessarily, be increased to 2gm per 10 kilos. The possibility of intoxication from such a dose even if repeated, is small.

Treatment of Further Cases

With the information obtained from the above three cases, a routine method of therapy was devised. This routine method has since been employed in the treatment of 12 cases of clinical coccidiosis, with success in all except one. This exception was a case of coccidiosis, which was complicated by distemper. The routine treatment is 10cc of a 1% solution of S.S.S. per kilo as an enema, repeated in 24 hours. In no case have any symptoms of intoxication or vomition been observed, and the retention of the enema has been satisfactory. After the administration of the enema, the tail of the dog is held down over the anus for about five minutes to prevent immediate expulsion of the enema, but the dogs did not show a tendency to do this and many dogs have retained the enema for 24 hours even though rectal tenesmus had often been in evidence prior to treatment.

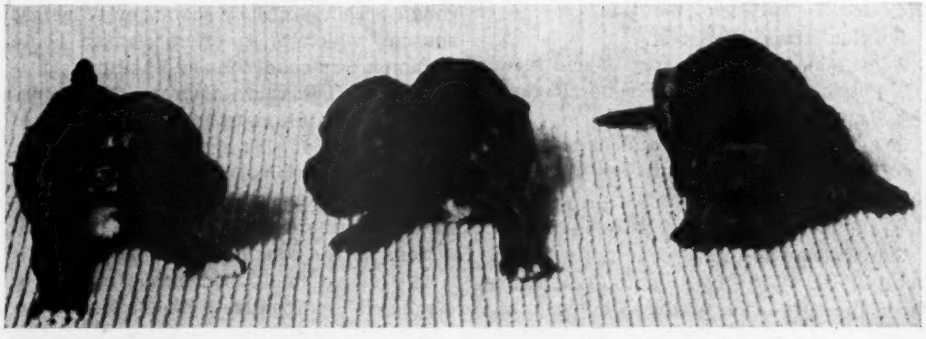
Definite improvement in the habitus, the appetite and the state of the feces was apparent usually within 24 hours and always within 48 hours. Usually by the end of the fourth day the feces were more or less normal.



The appetite was improved within 24 hours after treatment

In most cases the oöcysts were absent, or present in very small numbers by the sixth or seventh day, the decrease in number being obvious by the fourth day. In several of the cases the opportunity occurred of doing a fecal examination some months after recovery, but in no case were the same oöcysts found. In one case an infection with *I. rivolta* occurred after recovery from *I. bigemina* infection.

One case of coccidiosis in a cat was successfully treated, the dose and amount of the solution being the same, proportionately to weight, as that used in the dog.



Cough, Its Physiology and Treatment

by J. LA VERE DAVIDSON
Major, V.C.
TS, A.A.F.T.T.C., Sioux Falls, S. Dak.

COUGHING may be a voluntary act but it is generally reflex in nature and initiated by some irritation either in the throat or the bronchial tree. It may result from irritation in the lower parts of the respiratory tract or from the pleura. In some nervous breeds of dogs there is also a psychic factor in that hearing another animal cough may cause the desire in the second animal.

The irritation of the mucus membrane to which we have referred causes reflex stimulation of one of the branches of the vagus nerve or of the cough center which is followed by the sudden expulsive effort which tends to force out into the mouth movable matter such as mucus, food crumbs, and any foreign particles that may be present.

The cough center probably lies in the floor of the fourth ventricle of the brain and at the level of the respiratory center. Certain areas on the surface of the vocal cords and at the point of bifurcation of the trachea appear to be the most sensitive areas associated with this center which respond readily to local stimuli.[1] This constitutes considerable protection to the individual animal since it serves to expel quite readily infected material in such a manner as to prevent infection of the opposite lung.

The usefulness of coughing as a means of removing material from the air passages is rather obvious. The disadvantages of coughing, however, are numerous. Although some of these are of minor importance, they are all worthy of mention:

1. Interference with rest.
2. An added strain to a weakened heart.
3. Possibility of cerebral hemorrhage.
4. Rupture of aneurysm.
5. Aggravation of pain and exhaustion.
6. Postoperative hemorrhage.
7. Rupture of lung abscess.
8. Tendency to dislodge thrombi.

Many other untoward conditions may be accentuated by the exertion and heightened blood pressure often produced by coughing.

Sedative-Expectorant Treatment of Coughing

The treatment of coughs associated with upper respiratory infections or acute bronchitis is directed at increasing bronchial secretion when it is scanty, to its liquefaction when it is thick and tenacious, to decreasing secretion when it becomes excessive, and to depressing the cough center when coughing becomes injurious and too frequent. The treatment of chronic coughs may be quite similar to that indicated for the acute, but a greater depressant action may be indicated. It has been shown that a cough has a useful function of expelling foreign materials. It may not succeed in accomplishing this, however, because of the stickiness or physical consistency of the foreign material which is present or which prevents its adequate removal. In such cases it may be desirable to administer a medicament capable of both liquefying the tenacious mucus present and of depressing the overactive cough center. In such instances the administration of a preparation presenting balanced combinations of sedative, expectorant and anodyne action, is indicated. The sedative expectorants,[2] ammonium chloride and antimony and potassium tartrate, tend to soothe the acute inflammation mainly by stimulating the secretion of protective mucus. Ammonium chloride causes the sputum to be more fluid and less tenacious and may increase its quantity. Therefore it is useful in a light cough accompanied by scanty or tenacious sputum, which is so often seen in acute inflammatory conditions and asthma. Antimony and potassium tartrate and potassium guaiacolsulfonate add to the action of medicaments of this type because of their expectorant action. Drugs such as codeine phosphate, diethyl morphine and chloroform contribute anodyne and depressant actions on the cough reflex.

The above mentioned drugs should be combined therapeutically in pleasantly fla-

vored vehicles to exert the expectorant and sedative properties necessary for control of cough. They are useful in the coughs associated with upper respiratory infections, acute bronchitis and tracheitis usually seen in canine distemper, and in chronic bronchitis.

Nonspecific Vaccine Therapy in Chronic Coughs

Many times, when resistance is low, chronic coughs do not seem to respond to the customary symptomatic therapy. In such cases something besides a cough syrup may be indicated, something to stimulate or reactivate the body's antibacterial defenses.

Goldstein[3] obtained (in children) excellent results in the treatment of chronic coughs from nonspecific therapy using various vaccines. He used combined B. typhosus and B. parathyphosus A and B vaccine and also pertussis vaccine, as well as a vaccine of B. typhosus alone containing 1,000,000,000 organisms per cc.

This author has used, with good results, subcutaneous injections of fat-free sterile milk in the treatment of chronic bronchitis and tracheitis in dogs. The usual dosage of sterile milk was from 2 to 5cc depending on size and condition of the patient, this was repeated every other day until 6 to 8 injections had been administered. No untoward reactions were noted following these injections. In the majority of cases the dogs were relieved of their coughing spells after the first or second injections and coughing stopped after the sixth to eighth treatment. Medicinal treatment was administered during the course of injections as symptomatic therapy.

Rationale of Treatment with Vaccines

Every infectious disease is a struggle between the pathogenic powers of bacteria or viruses and the resistance of the subject. It seems possible to modify this struggle under some circumstances so that an animal's susceptibility can be transformed to increased resistance, and the virulence of the invading offender with any secondary invaders mitigated.

It is known that a specific vaccine will stimulate humoral and tissue antibodies against different organisms and various strains of bacteria other than those for which it is specific. It seems likely that the typhoid vaccine and sterile milk has nonspecific antigenic properties which stimulate antibody formations or else weaken the bacteria in some way making them more susceptible to phagocytic activity which destroys them.

The data obtained from Doctor Goldstein's blood counts indicate that following the vaccine injection there was a prompt bone marrow response causing an early leucocytosis and increased polymorphonuclear count. This was followed the day after treatment by a stimulation of the reticuloendothelial tissue system manifested by the fact that the large mononuclears were on the increase while the number of lecocytes and polymorphonuclears were on the decrease. During this period and thereafter there was continual clinical improvement.

Summary

Coughing is generally caused by irritation of the mucus membranes of the pharynx, larynx, trachea or bronchi by foreign bodies or by pus and inflammation. The irritation may arise from several sources, many of which are amenable to treatment with suitably prepared cough formulas. These formulas should provide balanced drug combinations of sedative, expectorant and anodyne action which are useful in the treatment of acute coughs associated with upper respiratory infections and acute bronchitis. The ease of administration of cough formulae to small animals is increased by the use of pleasantly flavored vehicles.

Nonspecific bacterial vaccines and the use of fat-free sterile milk are useful in the treatment of certain chronic coughs, apparently because of their nonspecific antigenic properties which stimulate antibody formation and phagocytic activity.

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Unusual Outcome of Superfoetation(?) in a Cow

EARLY in the morning of August 19, 1943, I was called to the farm of Mr. Ally Perry of Vassar, Mich. Over the phone he told me he had a three-year-old Durham cow that was straining and passing blood. When I suggested that she might be trying to calve, he informed me she had a calf by her side born five weeks before.

Upon examination I discovered the blood was coming from the rectum. However, the lips of the vagina were swollen as if she were ready to calve. I examined the os through a speculum and found it normal. For some reason I examined the uterus through the rectum and told the owner that there was a seven-months fetus in the right horn. The old fellow laughed and said that when Doctor Logan was in Vassar he had delivered twins from a Jersey heifer, 10 days apart. I guess he thought I had hold of something else. The sequel is: Mr. Perry called me November 5, 1943, and said that the Durham cow had just dropped a normal calf and was all right.

When I saw this cow in August, although there surely seemed to be a fetus in the horn, since she had had a calf recently, I figured she must be suffering from indigestion and that that condition induced the straining and the swollen labiae. The breeding dates on this cow could not be verified, but a hired man on the farm said she had been bred several times.

The foregoing sound very "fishy," I know, but the sincerity and veracity of Mr. Perry cannot be questioned. Like anyone else he can be mistaken, of course, but he believes the circumstances to be just as stated. I shall be glad to see comments upon this case.

R. A. BARCALOW

Fairgrove, Mich.

The contribution of Dr. R. A. Barcalow, "Unusual Outcome of Superfetation in a Cow," while highly interesting in some respects, is very incomplete in many ways.

1. B. does not describe either of the calves mentioned nor state that he had seen them.

2. No proof is presented that either of the calves was produced by the cow in question. It is not stated that the owner saw either calf born. The fact that a cow has a calf at her side is not proof that she is its mother. I was called by a client to determine the parenthood of a foal. The foal was nursing an old, ordinary grade blind mare. The owner believed the foal superior to her productive power. Her afterbirth was hanging from her vulva. Her dead fetus was in her uterus. A high class imported Percheron mare in same enclosure was in foal the evening before and now looked empty. She was clean. Her uterus was empty. The maternity of the foal was reasonably clear and was registered in the studbook.

My father was walking through the barnyard and found a halfgrown shoat sucking a heifer in advanced pregnancy. He caught the pig but the heifer charged him and he had to release the porker and retreat. Later the heifer gave birth to a calf: it is reasonably certain that the pig was not her young although it was at her side, she was suckling it and ready to fight in its defense—much to my father's irritation.

3. B. designates the occurrence as "superfetation." The possibility of the occurrence of superfetation is admitted by numerous veterinary obstetrists, without having recorded any authentic case. It is easy to admit its possibility and impossible to disprove it.

B. states that on Aug. 19th, the cow had a five-week-old calf at her side and that 78 days later she gave birth to a normal calf. Between the two stated births there was an interval of 113 days. No definite statements regarding the sizes of the two calves at birth are recorded.

A cow in twin pregnancy sometimes gives birth to living calves with an interval of 40 or more days between the two. The phenomenon has not been fully investigated. It seems probable that in such cases the twins are in separate chorions: the rule is that bovine twins are in fused chori-

ons with a common allantoic sac and circulation.

In twins born at widely separated intervals, e.g. one at 245 days and the other at 285, the first would naturally be of subnormal size and development, while the latter would be of normal size. The growth of the born calf and the intrauterine fetus would probably be approximately parallel, so that when the latter is born the two calves would be nearly of like size. But in this case if twins were present, and the latter was born at 285 days, the first would need have been born at 172 days: it is not known that a viable calf has been born at such interval. If the first calf was born at 245 days, it would follow that the second must have been born at 358 days: a prolonged gestation which should have been accompanied by abnormal size, hair coating, dentition, etc., as described by Roberts in October Cornell Veterinarian.

In case of the alleged superfoetation, if the fetuses were born at about 285 days each, the second impregnation would have occurred at about the 113th day of pregnancy, or 3.8 months. At that date the cervix is physiologically sealed so that spermatozoa could not pass. The probability or possibility of the seal being dissolved at estrum is unknown.

Long before the date named the uterus would have multiplied greatly in both longitudinal and transverse diameters and the allantochorion would have extended from ovarian pole to pole, completely filling the uterus. If the spermatozoa were to meet the ovum they would have to pass through the utero-chorionic space from the cervix to the ovarian pole. If that be accomplished, there would remain no uterine caruncles with which the membranes of the fertilized ovum might acquire nutritional connection. Sometimes when all caruncles have been destroyed by disease a fertilized ovum is nourished through adventitious placental structures formed by the uterine mucosa between the caruncles. But this could not conceivably occur in a gravid uterus, since the allantochorion of the second pregnancy would need envelop the fetal membranes of the primary pregnancy, and then when one fetus was expelled the other must have accompanied it.

A case which would seem incompatible with Professor William's theory, was reported* in a registered Chester White sow in 1938 by Dr. D. M. Swinehart of Elida, Ohio. He reported that exact records were kept and that the sow was bred on May 11, 1938, and on June 5th she showed signs of estrum so she was again mated to the same sire. She farrowed a litter (8) normal pigs on September 2nd. Just 25 days later she farrowed a litter (9) which too were normal. The Doctor calls attention to the fact that there were the same number of days between the two farrowings as there were between the two matings. The sow was the property of D. C. Gamble of Lima, Ohio, who may be seen at the right holding two of the older litter while Doctor Swinehart holds two of the younger litter

While there is no way by which the apparent conclusion of B. that superfetation occurred may be directly disproved, it would be unfortunate to make a diagnosis of such without thorough consideration of all factors involved.

W. L. WILLIAMS

Ithaca, N. Y.

* * * *

Snow and Budd (1853-73) did something for medicine that generations of speculation about causes had failed to do: they showed the way to practical methods of preventing the spread of infection. For this it was sufficient to be convinced that the disease was caused by a living agent, thrown off by the patient, which could reproduce itself—but neither of these men knew just what the agent is.

*Swinehart, D. M., Superfetation in a chester white sow. *Vet Med.*, 33:12, p. 583.

Autobiography of a Veterinary Practitioner

By E. T. BAKER, Moscow, Idaho

XXIII

A Week of Winter Practice

AS A RULE, practice runs along about the same year after year, much as football follows baseball, and then comes basketball and bowling, with golf and tennis opening up again in the spring. About the only things that tend to disrupt the usual annual procession of cases are the weather, the price of various animals and out-of-the-ordinary epizootics.

However, I recall that the fall of 1940 was one of the wettest ever known in the northwest. Fortunately, the harvest was not interfered with, but the rains began so early and kept at it so steadily that many fields of late oats, wheat, beans and potatoes were lost. In early winter one could see grain drills standing out in the middle of a field all ready for seeding and, with sacks of treated wheat still out there, but now green from the warm weather and excessive moisture.

At about the same time, on a trip to the middle west in November, we found very different conditions, with cold, dry weather and one of the worst storms ever known so early. We happened to be passing through Denver on Armistice Day, with the wind and snow howling in from Wyoming, and saw the results of where two storms came together in Iowa.

To the practitioner, therefore, weather is a very important feature, and we keep in close touch with all the various forecasts, including our own barometer. We still notice a large number of milk fever cases during a pre-storm period, when the barometer is dropping just as we see an unusual number of bloat cases and wire cuts in the spring before a spell of bad weather.

Let us describe a few cases taken from a week of typical practice in northern Idaho, at an altitude of some 2,600 feet where winter usually begins around the middle of November, with most of our snow in February. We count on two to five feet of snow during the winter, with the thermometer dropping down to 20° below. However, we might add, this does not seem as cold as 10° above zero in Chicago, because of our rather dry atmosphere.

In keeping with the usual season, our first case this week was a surprise. Early Monday morning, we received a call to a Catholic Mission where the Sisters of Charity conduct a school for the Coeur d'Alene Indian children. They also have a farm with a number of animals, including an up-to-date dairy herd.

We found a big mare completely paralyzed and were thinking of azoturia or forage poisoning when a colt, almost as large as the mare, walked up and tried to suck her. We learned that this colt and mare had been out on pasture all fall with no grain and quickly changed our diagnosis to a form of eclampsia or grass tetany. Her ears were cold as a banker's heart, and the entire clinical picture looked like milk fever in a cow. We figured most of her calcium was in the colt.

We have her a capsule of equal parts chloral and gum acacia, for she could still swallow readily, and 500cc dextrose and calcium gluconate. A powder containing various minerals was left to be given as an electuary. In all our years of experience this was a new one on us, particularly so

late in the year. Had it been June, we would not have been surprised.

A Routine Case

Just after we had returned from our hundred-mile trip to the Catholic Mission, a farmer, living out about five miles, called us up to see a Hereford heifer that was trying to increase the cattle population with but little success.

We dressed for the occasion at home and took along a 250cc bottle of warmed calcium gluconate. As Doctor Krill, of Ohio

After calving the cow is kept in box stall awhile before she is put on pasture

State, once observed in his talk on obstetrics, at a Mississippi Valley convention; we depend more on a good right arm, chains, block and tackle than on hooks with which to puncture the uterus.

First of all, we like to have our patient in a position with the hind parts slightly elevated, with a bale or hay or straw under her belly in case she takes a notion to lie down. Next, we inject the gluconate into the deep muscles of the shoulder — this seems to relieve straining and subsequent eversion and also helps to remove the placenta in a normal fashion. Third, we make a manual examination to ascertain the trouble and then get everything ready for, when we start, we want to remove the fetus as fast as we can to prevent suffocation.

In this case, we found the left front foot of the fetus bent back. By repelling the head with our left hand, we were able to get the foot in normal position. Then we adjusted the chains and following our usual procedure, we had the owner do most of the pulling, thus making him realize just how difficult the operation can be. We have found that such participation tends to make owners more appreciative and induces them to part with the fee in a more generous fashion.

From the time we left the house until we returned with a $10 check, just one hour and 20 minutes had elapsed. We constantly encourage our clients to call us up at the earliest possible moment and, since we make our charge accordingly, we have cooperation. Years ago, we used to work all day or night on one of these cases, and consequently had to charge $20 or $30, even if the mother and young both died—due to neglect.

Another thing, to secure the best results, we insist that the cow and her calf be kept in a box stall for a few days. They seem to do better. Mother nature is a pretty good doctor herself but, like the veterinarian, she doesn't do her best work on a leeward side of a wire fence in a blizzard.

Still Going Strong

Early Tuesday morning we received a call to remove the afterbirth in a Guernsey cow which had calved Sunday morning. The owner said she was beginning to lose her appetite and "act funny." Perhaps if his urethra had been blocked, preventing normal urination for nearly 24 hours, he might not have been too comfortable himself.

First of all, we gave her 250cc calcium gluconate intramuscularly, with two Reeks' bovine capsules and, with rubber gloves, we removed the placenta and inserted two uterine capsules. (Except where there is much infection, we do not "flush out" the uterus any more.) Then we left a little powder for the owner to give as an electuary.

Later on that morning we looked at a big mare with the left hind fetlock greatly swollen and the coronary band very sensitive. We diagnosed the trouble as a gravel working its way out. We suggested the shoe be taken off, the sole trimmed and the foot soaked in a "clean" mud or sand pack, with a little lysol added. We gave her a capsule of equal parts aspirin, sodium bicarbonate and sulfanilamide together with a "shot" of mixed bacterin. Leaving the owner some hoof oil and a powder to be mixed with syrup and given as an electuary, we moved on to our next case.

A purebred Hereford cow which had calved only the week before pushed the door of her box stall open and filled up on a mixture of ground oats, wheat and barley, of about equal parts. This had happened two night before and, up to now, she had shown no signs of illness.

We found her standing like the last rose of summer, with all the typical symptoms of founder, and perhaps a little touch of milk fever. Even her hoofs were feverish and her left flank felt like a bride's first batch of bread.

First of all, we gave her 500cc equal parts calcium gluconate and dextrose, intramuscularly, with a quarter grain eserin and a tenth of lobelin added. Net, we administered an aloin purgative capsule, with a couple of Reeks' bovine capsules, and one of tartar emetic. We applied hoof oil to the feet and, just before we left, administered 100cc normal blood serum. We left the owner a powder of general stimulants and rumen stimulants to be given as an electuary.

We used to give these cases all kinds of physics, oils and salines, and get messed up in administering them. We now find the gluconate seems to start action in the pillars of the rumen and assists nature in taking care of the overloading of the paunch. Usually in about three days, the owner calls up and wants to know how much to feed the patient.

The next case was a reminder of the dear old, golden days, for it was none other than our childhood playmate, fistula of the withers. It was in a seven-year-old gray gelding and the owner explained "he had been touchy in that shoulder ever since harvest."

We gave him a "shot" of mixed bacterin and a capsule of sulfanilamide and sodium bicarbonate. We also took a piece of gauze bandage and dipped it into our "red oil" and inserted this in the sore. Leaving the owner a good tonic and vermifuge powder to give in the oats twice daily and a little red oil for him to fool around with, we left both him and the patient resting much easier, while we carefully filed away a check for services rendered.

Then our mind wandered back over the past few decades, when the patient would have been "throwed" and the "thislo" with most of the neck removed, while blood spurted all over the adjacent territory. "Gotta git that there core out fore it will heal" was the general verdict. Usually, we would be called after the owner, grandpappy and Uncle Zeke had blistered the parts with blue vitriol or other caustics, and the patient had to be roped on the dead run. "Them was the carefree days" when a scalpel and blood flying in all directions marked the true scientist and eminent "veterinary surgeon."

We Put One Over on the Puppy

Next we administered the first "shot" of canine distemper vaccine to a cocker spaniel pup.

In order to keep the little patient from giving vent to a large sized yelp, we have a little piece of rubber tubing on a medicine dropper. From a small, wide-mouthed vial, as is our custom, we draw up a dropper full of elixir lactated pepsin and "Shoot" it in the puppy's mouth. Then, while it is enjoying this toothsome mixture, we slip our 19G needle quickly into its hide and the job is done before it really realizes what has happened.

Both the owner and the pup have a good time using up the elixir I leave in a devitalized case

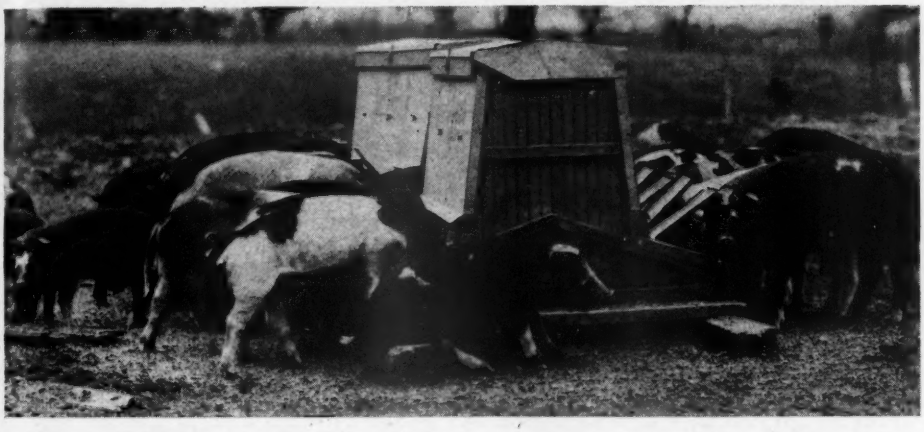
In devitalized cases, we always give the owner a little bottle of this with some calcium gluconate added—he and the pup have a lot of fun using it up.

Now, we are not a small animal practitioner and do not claim to know much about the critters, but we do know that three cents worth of psychology will go a long

way with the average owner, especially with a woman.

We Treat Erysipelas

A farmer with about 60 fall pigs called up and asked us to come out and look at them. He said they were not doing well and that some of them were lame and squealed when touched. Placing a couple of bottles of erysipelas serum and warmed calcium gluconate in our grip, we set sail for the seat of war. We found the animals acting as Doctor Breed has so aptly described the condition, "one of overstimulation and excitement."



We give serum to all the animals and, to the infected ones, we give calcium gluconate intramuscularly

We not only give serum to all the animals in such cases, but add from 10 to 30cc calcium gluconate intramuscularly to the infected ones. In addition, of course, we use the oral alkalinizing treatment, with sour milk or buttermilk, oats, a little aspirin and a general conditioner and vermifuge. We like to have them separated into small bunches, so they will not pile up, get overheated and then go out in the cold and pick up pneumonia—which would mean more shovel work for the hired man.

As we look back over the years, we can see we have had this condition for some time but did not recognize it. While hog cholera serum will help some cases, we can now look back and see why we had some "breaks" which is a delicate and refined term for a mistaken diagnosis or just plain hard luck.

And Still They Come

Our next case was that of a jack which had been turned out in a corral with a bunch of other horses and mules. In some way or other he was kicked in the region of the penis and, when we arrived, was suffering extreme pain.

We gave him a capsule of equal parts chloral and gum acacia and a quarter grain of atropin. Years before, an old country physician had told us he used one part of guaiacol in 20 parts camphorated oil for orchitis in the human and we tried this, for what will work on one jackass should be equally efficacious for another. We also had the owner make a suspensory bandage and leaving him a powder with a little aspirin in it, we left. In about a week, the condition was much improved.

About this time we received a call to see a cow that had just freshened and was unable to get up. This very peculiar and difficult-to-diagnose ailment occurs in our practice about 150 times a year. In fact, during September and October of this past autumn, we had just 46 cases of milk fever.

Treating this disease has become an art and a science with us. What we want is a cow back to her normal flow of milk in a week or so and, also, a satisfied client. Not only that, but if the treatment seems too simple, the client is going to regret calling us and will also kick on the bill.

About five years ago, we treated a case for a dairyman who has always been a good

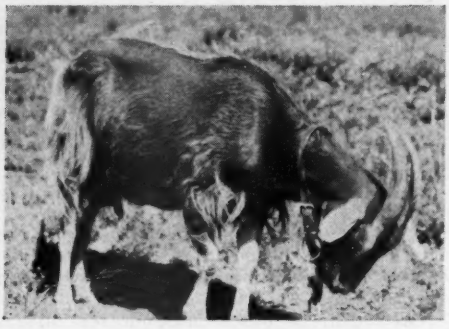
client of ours. She was up before we could get the needle out of her jugular.

"Gosh, Doc, she would have been up herself, she had such a light touch of it," he observed.

The next case, he discovered about noon, and let her go until after supper, as he expected she would get up also. Just about the time we were getting ready to go down to the Elks Temple for a bowling match, he called us. As we drove home, we reviewed the situation. Like other practitioners, at rare intervals we indulge in thought (the rest of the time we merely use our muscles).

Incredible!

Our next case, can you believe it, was that of a milk goat suffering with acute indiges-



A mild case of mastitis was developing

tion. This animal had been tethered along the highway and given very little grain. Its digestive tract was as quiet as the Italian navy and its milk supply had dropped to almost nothing.

Not only was Tilda Marie Toggenburg "bound up tightern a drum" but she was developing a mild case of mastitis.

First we injected 100cc calcium gluconate in the region of the shoulder, massaging well. Next, we gave her eight ounces of our bovine laxative, of which sodium thiosulphate is a leading constituent. For some reason or other, this drug seems to have a very favorable action on the mammary gland as well as on the digestive tract.

An electuary powder consisting of ginger gentian, nux vomica and tartar emetic was left, and whole oats and iodized salt suggested, with the addition of bright alfalfa hay. We suggested the udder be bathed with salt and vinegar solution thoroughly dried and milked out four times a day.

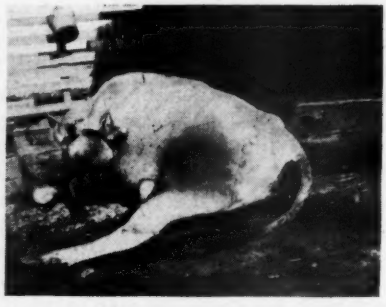
This was a poor family and we forgot to make a charge.

A Little Psychology Helps

We reasoned thusly: Suppose we called a plumber to fix a leaky pipe and, when he arrived, he merely gave it a little twist or two, smiled at us as if to say: "Why, any poor simp could have fixed that," and then returned whence he had come. At the end of the month, we would receive a bill for two bucks.

But, suppose our plumber was made of sterner stuff, and with years of experience to back up his gray hairs around the temples, what would he do? He would take a glance at the pipe suffering from a slight umbilical hernia and gasp to himself. Never, in 20 years, had he been called to see such a serious and unusual accident. In a few short breathless hours, our entire plumbing system would have been tee-totally ruined. We would shudder at the bare idea. Then, he would go back to his shop for a very special wrench and return ready to save our home and fireside from destruction. At the end of the month a neatly typed bill for $12 would grace our mail.

What would be the result? We would have paid the $2 grudgingly and "beefed" whenever we thought of it. On the other hand,



We make quite a fuss over the cow and coddle her

we gladly and willingly pay the $12 and feel an everlasting debt of gratitude for getting off so easy.

So, in treating a case of milk fever, we now inject 500cc gluconate and dextrose intramuscularly, with 20 or 30cc sterile

camphorated oil; give a rectal injection of about four to six ounces of the following mixture: eight ounces glycerine mixed in 24 ounces red water. It is remarkable how "powerful this red stuff is to bring out the masses of hard feces."

Next, we rub liniment carefully over the point of injection, massage it thoroughly, and then rub some more liniment over the back and loin. We also leave some for the owner to apply (for he dearly loves to do this, so why deprive him of such a simple pleasure?). Finally we leave him a powder to be mixed in corn syrup and given as an electuary, with instructions to keep her in a comfortable stall or shed for at least three or four days.

As a rule, she gets up in from two to four hours and the owner tells all the neighbors who drop in that "She was night onto bein' dead if I hadn't got Doc when I did, an' me an' him saved her."

Does he squawk when he comes in to pay his bill? He does not. The older we grow the more we appreciate what a wonderful aid to science a little psychology can be. Too bad more of this is not taught in our colleges!

Cats Are Popular

Several women called up and described their young cats as having some kind of a "distemper." The patient would be apparently all right one day; sneeze before breakfast on the next; be affected with a green vomit about noon, and be dead the following day.

We have often wondered if this type of gastroenteritis or feline "flu" has any connection with human influenza, for they often appear about the same time. We notice that Doctor Whitney in Housedog Disease* intimates that there is a very definite relationship in the occurrence of the disease in the household pets where one or more members of the family had colds at the time or shortly previous.

Our best results have been obtained giving one dose made by mixing two drops turpentine and five drops spirits of camphor in a little syrup. This is followed with calcium gluconate solution in elixir lactated pepsin. Perhaps an enteric tablet of sulfanilamide might help.

It is surprising how much interest is taken in the ailments of cats. We answer the veterinary queries for a large farm journal and, on the average, several each week come in about cats. On the farm, just as in ancient Egypt, cats are valued pretty high, particularly good mousers.

The great trouble in treating feline diseases is largely due to the fact that the owner never notices anything the matter until the patient is beyond redemption. A little more information on the proper care and diet of cats will help the general public.

*Whitney, Leon F., Housedog Disease. *Vet. Med.*, 38:11, pp. 419-428, 1943.

There is a great deal of interest taken in the ailments of cats. A good mouser is of value on the farm. More information on the proper care and diets of cats is needed as the owner just never notices anything wrong until the cat is beyond redemption

Some More Routine

A small farm flock of about 35 grade, medium wool ewes began dying and, after six had turned up their toes, the owner called us in. We found they had pregnancy disease.

All the survivors were given 100cc calcium

The deaths were caused by pregnancy disease

gluconate and dextrose in the axillary space with our Simplex intravenous outfit. However, we use a 15 gauge needle. Probably an 18 gauge, short needle would be better. With plenty of massage and by avoiding hitting the periosteum, we have no trouble. A suitable powder containing calcium, iodine and phosphorus was left to be mixed with the salt.

We wound up the week with our old winter standby—equine impaction. If we're never called to treat another sick horse we shall be happy. Our idea of heaven is two cases of milk fever every morning for cash customers and no canine distemper or equine impaction.

Our mortality in equine impaction is as high as it ever was, and for three reasons: First, most of our animals are old and devitalized from an unbalanced diet of straw and scenery with worms and bots; second, their digestive systems are just "petered out" from too much bulky forage; and third, the owner seems to hesitate to call us until the undertaker should be given a buzz instead.

We have treated thousands of these cases during the past 30 years. We have used everything except a stick of dynamite. We

Inappetence; slight periods of abdominal pain; little, if any, peristaltic sounds, and injected visible mucous membranes, signalize the onset of impaction

see cases get well that should, by all the clinical symptoms, die, and vice versa. We make no prognoses. We merely "treat 'em and trust to God."

In general, our advice is not to overtreat these cases. Give nature a chance, and do

Later protrusion of the rectum, staggery gait, glassy eye and cold sweating occur and, in fatal cases, the animal gradually succumbs to exhaustion

not be in a hurry. Arecoline, eserin and even lentin should be used with care, if at all, until some preliminary medication has been given.

And so the week is gone, with a multitude of new cases, new owners and new results. This together with city meat inspection, state work, and farm journal editorial work, keeps us pretty busy. Years ago, we resolved to be as good a practitioner as we could and not spend time on outside activities and, as we have said before, we make mistakes but we try to profit by them. We must accomplish more good than harm or we would not have survived in the same location for nearly 35 years.

(To be continued)

Clinical Reports

Urinary Calculi in a Dalmatian

October 29, 1942, a call was made to see a male Dalmatian, nine years of age, with the following history. Two weeks previously, the dog had shown symptoms of difficult defecation and frequent urination. The owner, believing the trouble to be due to worms, gave the animal a commercial worm remedy. Seven days later symptoms of lameness in the hind quarters developed. Extreme pain accompanied walking, sitting or lying down, consequently the patient remained in the standing position. On the tenth day the patient was brought to the hospital.

Palpation of the abdomen revealed an abnormal distention of the bladder. The odor of urine was quite evident on the breath. There was congestion and slight icterus of the mucous membranes.

Several unsuccessful attempts were made to pass a rubber catheter. Upon passing a steel catheter an obstruction was found just posterior to the os penis. The area around the calculus was anesthetized by infiltrating with 1% procaine solution. An incision, approximately two inches in length, was made immediately over the calculus. Upon incising the urethra, urine forcibly escaped through the opening. A calculus the size of a large pea was found and accompanying it were innumerable smaller ones—pin-head size and smaller. Approximately a liter of bloody urine was passed. A diagnosis of uremic poisoning was made and an unfavorable prognosis given.

The post-operative treatment consisted of forcing the patient to exercise, as the bladder was believed to be paralyzed. Fifteen grains of methenamine was administered per os.

The next morning, following the operation, the patient and his cage were literally covered with blood. He was given a bath and upon exercising there was a continual dripping of bloody urine from the incision. However, the symptoms of lameness and dullness were less evident. Another 15 grains of methenamine was given and the patient again placed in his cage. Twenty-four hours later death occurred.

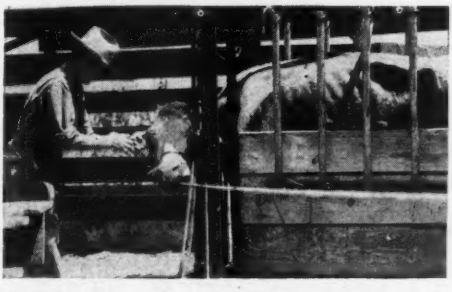
On necropsy considerable urine-tainted fluid was found in the abdominal cavity. Slight congestion of the bowel was noticed and in the posterior portion the feces were rock like in consistency. The bladder was approximately four times the normal size—due to increased thickness of its wall which measured seven-eighths of an inch. Hundreds of small calculi and a small amount of urine and clotted blood were found in the bladder. The ureters showed no macroscopic lesions, however, the kidneys were quite soft and had a parboiled appearance. Other organs of the body gave little or no evidence of a pathological condition.

DON R. BOWERS

Downs, Kansas

Removal of Ocular Neoplasms

While the everyday routine of a veterinary practitioner seldom attracts press notice, the recent experience of Dr. T. T. Christian of Waco, Texas, illustrates the



The 13th cow operated upon at one setting. Had to tail her up. She died. The other 12 healed by primary union

salvage of meat animals obtained through the veterinarian's alertness to that end. On a ranch containing 1700 beef cattle, 17 cows were found to be affected with malignant growth on one or more eyes. In four, the neoplasms were so extensive as to make removal impracticable. In the other 13, the removal of one eye resulted in salvage of the animals.

The operations were performed under local anesthesia (procain); the animals being restrained in squeezer chute as shown in the illustration. Doctor Christian states

he usually employs general anesthesia (intravenous injections of chloral hydrate solution) in such cases, but conditions on this ranch necessitated the use of local anesthesia only.

C. D. FOLSE

Kansas City, Kans.

Cotton-wool Diet to Remove Needle from Dog's Stomach*

August 4th, a bull-dog puppy, aged three and a half months, picked up a needle, which was threaded with wool. The owner, seeing the wool hanging from the puppy's mouth, pulled on it thinking she might remove the needle, but unfortunately the wool came away and left the needle *in situ*. Violent emesis was set up and the owner, becoming concerned, rushed the puppy to the surgery.

Oral examination did not reveal any sign of the needle and gentle palpation externally did not cause discomfort to the puppy, which had by this time ceased to vomit and assumed quite a normal attitude.

The owner was advised on returning home to feed the puppy with about a handful of boiled rice, and keep it very quiet pending X-ray examination.

August 5th.—The puppy appeared to be quite well the following morning and had not vomited the meal given to it the night before.

The X-ray plate showed the needle to be in the stomach.

Treatment and Course.—It was decided not to perform gastrotomy but to feed the puppy on a cotton-wool diet, similar to that fed to children who have swallowed foreign bodies of the same nature. (See *B. M. J.*, page 352, March 20th, 1943.)

The owner was instructed to tease out some cotton-wool and mix it thoroughly with mashed potato, stale bread crumbs and finely minced cooked horse-flesh, and feed the puppy four times during the day, each meal to weigh approximately 1½ ounces.

The feeding was carried out at the owner's home and strict instructions were given regarding keeping the puppy quiet and examination of each movement passed. The puppy, of course, was not allowed out of doors.

August 6th.—The puppy appeared to be quite normal. The owner stated that she had no difficulty in getting the puppy to eat the strange diet.

August 7th.—The needle was passed inside the cotton-wool with the point protruding, the time taken in the whole process of passing it being approximately 70 hours. The length of the needle was 6.25 cms. The weight of the cotton-wool passed was one ounce, which represented the amount contained in eight meals.

A. LAWTON TURNER, M.R.C.V.S.

West Bromwich, England

Veterinary Record, 55:41, p. 373, 1943.

Hypertrophy of Incisors in a Rabbit

On December 17, 1942, a four-months-old, female Chinchilla rabbit was brought to the veterinary clinic of the Kansas State

College. Examination revealed extreme hypertrophy of the incisor teeth. The upper incisors had produced pressure necrosis of the mandible. The lower incisors reached to the dorsal region of the nostrils. The animal was emaciated, due to inability to eat, and exhibited excessive salivation.

The condition was remedied by clipping the incisors back to their normal length. This operation must be repeated from time to time as it does not retard the growth of the teeth.

LYLE WILKINS

Manhattan, Kans.

Improper Castration in Feeder Steers

There is at present a shortage of veterinarians and veterinary service for the "home front." To combat this shortage, just how much of his routine veterinary work should the farmer be taught to do?

May 4, 1943, a call was made to inspect a herd of 35 yearling feeder steers in a pasture 10 miles distant.

A history of castration two weeks previously of 18 of them by a neighbor farmer and subsequent swelling of the operative area and development of hard tissue masses was given.

The steers were driven into a barn and individually inspected. Sixteen of the 18 that had been castrated recently were found to be infected and to have masses of tissue in the scrotum. In most cases there was pus in the center of the masses.

The animals were roped, thrown one at a time and tied in a small corral adjoining the barn. The scrotum was scrubbed with a solution of pine oil and a circular incision made one third the distance up from the bottom of the scrotum down to the tunics, which had been left by the farmer operator, and inside of which was most of the infection. The cords of infected tissue were separated from the surrounding tissue by blunt dissection up to the uninfected and healthy cord from which they were separated with an emasculator. All infected tissue left after this procedure was removed with a scalpel. Finally powdered sulfanilamide was sprinkled on the operative area.

Of these 16 steers, one developed a double hernia about 30 minutes after he was released. (This steer when thrown had landed very hard). Five days later the other 15 were well on their way to recovery. The animal with the hernia was butchered immediately so reparative measures were not attempted.

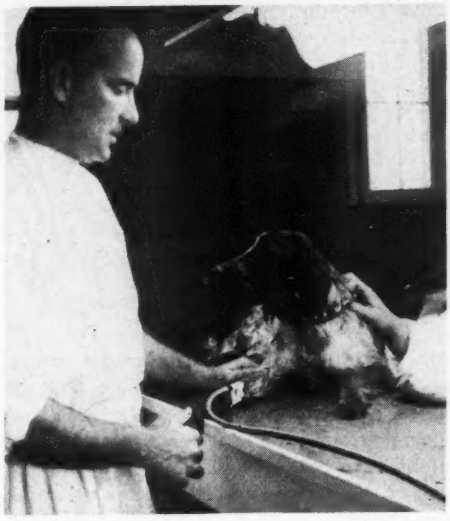
The apparent underlying cause of the condition of the herd was the method of castration. The testicles had been removed through incisions just large enough to permit their passage. The tunics had been left in the scrotum and infection had developed in these when the two small incisions had healed prematurely thus preventing necessary drainage.

LEO S. BERG

Harper, Kans.

Spirochetosis in a Dog

This English setter belonged to an army officer who lives in a small city near an army post. The dog was known to have frequented the city dump where, as is usual at such places, there were many rats. The



dog, on becoming ill, was taken to the veterinary dispensary at the post where a clinical diagnosis of infectious jaundice was made. This diagnosis was supported postmortem by an agglutination test of blood collected at the necropsy. Agglutination occurring in a dilution of 1 to 12,000 for *Leptospira canicola* and 1 to 200 for *L. icterohaemorrhagica*. The animal died on the fourth day following the onset of the disease and possibly evened the score since two large rats were found dead a week later near the place where the dog had been confined while ill. The animal is shown receiving an intravenous injection of dextrose solution. Additional medication was given by injecting it into the lumen of the rubber tubing with a hypodermic syringe while the intravenous injection (by the drip method) was in progress.

J. E. GREENE, Capt. V.C.

An Interesting Case of Parasitism

In the spring of 1943 Dr. A. A. Brecheisen, Welda, Kans., was called eight miles west of Garnett, Kans., to see a registered Brown Swiss six years of age and especially noted for a large production of milk. She had milked up until a short time previously and was due to calve within a month. This cow had been wintered with the remaining milk cows in the herd, all of which appeared in excellent condition.

Symptoms noted were: paleness of the mucous membranes with icteric discoloration, dyspnea, slightly accelerated heart beat, emaciation and weakness, especially of the hind limbs. The digestive tract was normal, except for darkened feces which might have been due to blood in the upper part of the digestive tract. The temperature was normal.

Ascaris lumbricoides.
a, male; b, female. Four-ninths natural size. From Neveu-Lemaire.

Parasitism was suspected, but because of the lack of a definite diagnosis and the animal's weakened condition, a course of symptomatic and expectant treatment was used. The weakness was combated with dextrose and calcium gluconate together with iron sulfate (two drams) and arsenic trioxide (four grains) daily as an anemia. No improvement occurred and in two days the animal became unable to stand. From lying down and being advanced in pregnancy, the cow developed prolapse of the floor of the vagina. A sling was improvised and the cow was raised to her feet for three hours daily. By catering to her appetite, which although diminished was never lost, and continuing the symptomatic treatment she began to gain strength.

Fecal and blood samples were obtained and examined. The blood smears were negative for anaplasma bodies and the differential count was not conclusive, being only somewhat high in eosinophiles. The fecal sample eliminated all doubt regarding parasitism as the first microscopic field examined contained many stomach worm eggs —showing a heavy infestation. Phenothiazine was administered in the form of phenite. Since the cow was large, four ounces of the solution was given in capsules with phenomenal results. About 18 hours later the cow passed a gallon of large roundworms, a tapeworm segment four feet in length, and no doubt countless thousands of stomach worms that were invisible. We were much surprised at the great amount of round worms passed, as no round worm eggs had been found in the fecal sample.

These round worms appeared not unlike the swine ascarid, *Ascaris lumbricoides*. According to Mönnig this parasite, *A. vitulorum*, occurs in cattle in the small intestine and by some the species is considered as identical with *A. lumbricoides*. *A. vitulorum* is found in various parts of the world and also infests Zebu cattle and the Indian buffalo. Phenothiazine is recognized as an effective anthelmintic for all nematodes but it is not regarded as a specific for cestodes or tapeworms. This tapeworm segment was probably a *Moniezia expansa* judging from the description given by the farmer. When we saw the worm it was "dried up" somewhat. Neither could we tell whether or not the scolex was passed.

The recovery was no less phenomenal for she began to gain strength almost immediately. She was given eight doses each of 10cc sodium cacodylate 30% solution intravenously to hasten her recovery. Doctor Brecheisen considers this drug the best of the arsenicals as a tonic and hematinic in cachectic conditions. Two weeks later the cow gave birth to a lively calf without aid and without the reoccurrence of the prolapse.

There were probably several factors which cooperated with the heavy parasitic infection to cause this cow's condition—long milking period, high production, approaching parturition and the inclement weather.

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Abstracts

Laboratory Findings from Swine Disease Specimens

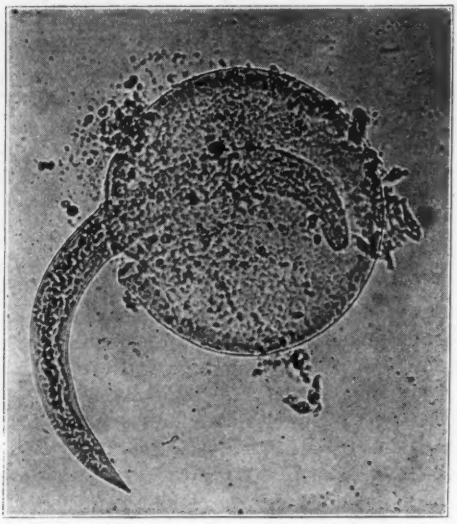
On account of the large number of swine laboratory specimens received which are found to be infectious arthritis, the opinion was expressed[1] by the author that probably practitioners often confuse this disease with others where lameness is evident—especially with erysipelas.

From a few days to three to five weeks after farrowing, is the age at which pigs become affected with infectious arthritis (joint ill)—the joints become hot, painful and swollen. There is weakness, rapid emaciation, accompanied by diarrhea, and death may occur in two to five days. However, the chief differentiations between infectious arthritis and erysipelas in swine are that the former is a pus disease and the joints contain a purulent, often caseous, material. In most cases of joint ill the pigs have pus pockets at the umbilicus and the victims are usually younger animals than those which become affected with erysipelas.

Special attention should be given to housing and sanitation during farrowing for if the navel stump be contaminated infection usually ensues. Frequent examinations should be made to detect inflammation and, if found, antiseptic treatment followed.

Next in order as to the number of specimens received at the laboratory are lesions caused by the nodular worm. Of the four species of this worm *Oesophagostomum dentatum* seems to be the most abundant and is found in nearly all sections of the country. If conditions are favorable, the eggs of this worm hatch within 24 to 48 hours after passage with the feces and they become infective to swine three to five days later. The larvae need moisture and migrate about so as to keep in a moist environment—after a rain or dew they attach themselves to blades of grass and pigs become infected when they graze these grasses. The larvae often remain viable and infective for 14 months in a pasture.

After the larvae are ingested they pass into the large intestine and the cecum and within 48 hours form nodules. At the end of three weeks of growth inside the nodule the worm leaves the cyst and enters the



Cyst from wall of large intestine of pig. Note larva of *Oesophagostomum dentatum* partly extruded from the cyst

lumen of the bowels where, in five to seven weeks, it starts laying eggs.

That treatment with phenothiazine, such as is used for nodular worm in sheep, may be a successful method to combat this parasite was intimated.

Lung trouble came third as indicated by the number of specimens received. Etiologically there are three classifications according to causation of such specimens—Dust, swine plague and secondary infections of hog cholera. Many lesions were received from hogs which had been vaccinated, which would indicate that immunity is not attained in all cases. The suggestion was made that the practitioner scrutinize his own methods carefully and remember that in building resistance to most any disease, the first requisite is a healthy subject, that the product must be properly handled and the virus must be viable. Then there are the problems of parasites and nutrition. Each of these conditions has a bearing upon whether a vaccination gives 100% protection.

[1] Dunlap, Glenn. A report of laboratory findings from field swine disease specimens. Presented to the Kansas City Veterinary Medical Association, September 21, 1943.

Sulfonamide Dressing Urged for Operative Wounds

The author[2] reports his technic, observations and conclusions in the routine use of sulfonamide powder in the course of 600 non-septic surgical operations. Attention is called to the fact that although implantation of sulfonamide powder in the wounds of compound fracture following débridement is now a well established practice, its routine use in sterile surgery has not yet been generally adopted.

Inasmuch as these drugs are only bacteriostatic, it is recommended that 5gm be placed in a salt shaker and autoclaved for 20 minutes at 18 pounds pressure prior to usage. Sulfathiazole is suggested for wounds contaminated with staphylococci while sulfanilamide was found to be satisfactory in clean wounds. In his observation of 150 cases in which sulfanilamide was used, 100 in which sulfathiazole was used and 100 in which various mixtures were used, practically no difference in results were noted; however, the author prefers a mixture of two parts of sulfanilamide to one part of sulfathiazole on theoretical grounds. In addition to the powder which was implanted in the wound, the suture line was covered as an added safeguard. The amount used was limited to 10gm per patient and no toxic symptoms were recorded except fever.

Doctor Key concludes that the routine use of sulfonamide powder in non-septic cases reduced the post-operative infection rate from the usual 5% to less than 0.3% in his series of 600 patients. The five deaths, seven hematomas, one separation of wound margins, and two stitch abscesses which occurred in this series were attributed to causes other than the sulfonamide dressing. Furthermore, it was demonstrated that a reasonable amount of sulfonamide powder had no retarding effect on the wound healing nor did it increase the size of the scar. However, warning is given that use of excessive amounts of the drugs does inhibit regenerative processes. Although the author mentions the use of local anesthesia in most of the cases, he did not attribute the complications mentioned to the inhibiting action of the local anesthetic on the sulfonamide.—J. E. G.

[2]Key, M.D., J. Albert, 1943. Wound healing and infection after local implantation of sulfonamide powder. *Jnl. A.M.A.*, 122:15, pp. 1003-06.

Plaster Casts for Burns

That the use of plaster of Paris casts in the treatment of burns of the extremities, has resulted in comfortable, rapid, uncomplicated convalescence, is reported[3] by Boston surgeons.

When the cast is placed anesthesia is not used. Except for removal of loose hanging skin there is no débridement or cleaning necessary. Under the cast there is a single layer of sterilized gauze and four layers of sterile open mesh gauze. The original cast is left on about 14 days—if necessary a second cast is put on for another 14 days. Tetanus antitoxin is given and if there are other burns on the body sulfadiazine treatment is given.

★ ★ ★ BUY WAR ★ ★ ★
STAMPS AND BONDS

Local Anesthetics Useful in Pneumonia

Price[4] reports prompt and lasting relief of pleuritic pains in pneumonia through intercostal nerve block, induced by injecting procaine into the intercostal nerves distributed to the seat of greatest distress. Persistent, agonizing, exhausting pain that prevented proper aeration of the lung and promoted atalectasis was promptly relieved for a prolonged period. Deeper breathing, greater comfort ensued immediately. No explanation for the relief long after the effects of the anesthetic had disappeared was afforded.

The author likens the effect of intercostal nerve blocking to the absence of pain in a sprained ankle long after the effects of the anesthetic has worn off.

[3]Levenson, Stanley M., and Charles C. Lund, 1943. The treatment of burns of the extremities with close fitting plaster of Paris casts. *Jnl. A. M. A.*, 123:5, pp. 272-277.

[4]Price, Harry J., The relief of acute pleuritic pain by intercostal nerve block. *Jnl. A.M.A.*, 123:10, pp. 628-629, 1943.

Book Reviews

The Horse; His Gaits, Points and Conformation. By *Paul Brown.* Artistic format; 64 pages, mostly illustrations. Published by Charles Scribner & Sons, New York, 1943. Price $1.75.

This is a beautiful volume that veterinarians can recommend to clients who are interested in horseback riding or horses; or can add to their "waiting room literature" with the assurance that it will have the almost universal appeal that high-class animal pictures possess. The subject is taught mostly by illustrations made from drawings by the author, there being but a small amount of text. Instructions are given also for those who would like to draw the horse and put action into their pictures.

* * * *

Diseases and Parasites of Rabbits and Their Control, Third Edition. By *Marcellus W. Meek,* L.L.B., Author of "Fur Rabbits," The Chinchilla Rabbit, Rabbit-Breeders Efficiency System, Standard of Perfection, Hutch Port-folio and How to Make Money with Rabbits. 189 pages illustrated. Rabbit Industries, Inc., Montebello, California, 1943. Price in durable paper $2.00; cloth bound $2.50.

The author, a lawyer, makes no claims to veterinary, pathological or parasitological training, and the work, except for discussions of rabbit husbandry, in which he qualifies as an expert, is wholly compiled from the writings of American and European authors. The discussions are remarkably well chosen, including such top flight authorities on diseases and parasites of rabbits as Frank G. Ashbrook, Dr. E. R. Becker, Professor H. L. Ibsen, Dr. Benj. Schwartz, Henry Gray, of F.R.C.V.S., Tom Hare, M.R.C.V.S., Dr. Ch. Perard, Dr. L. M. Hurt, Dr. C. G. Sanders and C. J. Davies, M.R.C.V.S., to mention only a few of perhaps more than a hundred recognized authorities who are quoted at greater or lesser length. The illustrations are mostly reproduced from government publications.

The work is intended for the rabbit breeder. The author states that he is fully cognizant, that it is not a scientific treatise that would be acceptable to the veterinary profession but that his sole aim has been to combine in one volume as much common-sense information regarding the ailments of the domestic rabbit as he has been able to glean from 10 years of intensive work with these animals.

It is the reviewer's opinion that no small part of the discussions are above the understanding of the layman and that contrary to the author's opinion veterinarians will find it a useful and convenient compilation of much of the scientific literature on the subject given in the title.

* * * *

The Biological Action of the Vitamins. A symposium by 14 leading authorities on the subjects discussed and edited by *E. A. Evans, Jr.,* Associate Professor of Biochemistry, the University of Chicago, 227 pages, numerous illustrations and charts. Published by the University of Chicago Press, Chicago, 1943. Price $3.00.

Within a score of years vitamins were looked upon as essential nutrition factors responsible by their absence for certain "deficiency diseases"—scurvy, beriberi, pellagra, etc. More recently it was discovered that, important as are these and other scourges due to frank deficiency of various vitamins or combinations of vitamins, there is a far greater field in which the deficiencies are subclinical and not to be recognized by the classical picture of acute deficiency of this or that vitamin. Still more recent is recognition of the interrelationships among vitamins and perhaps also among vitamins and hormones and enzymes, and of their effects, not only on man and higher animals, but also on plants and the lower forms of life including bacteria. This all sums up to an interest in the biological action of vitamins and understanding their use as therapeutic agents awaits understanding on this subject. It is to further such knowledge that The University of Chicago brought together these discussions of 14 world authorities on vitamins, to present the most up-to-date information on the biological action of vitamins.

The followig subjects are discussed: the biological action of the vitamins, cocarboxylase, clinical aspects of vitamin B_1, riboflavin, human riboflavin deficiency (aribоflavinosis), the story of pellagra and its treatment with nicotinic acid, pyridox-

ine, pantothenic acid and the microbiological approach to the study of vitamins, pantothenic acid in human nutrition, biotin, choline, the economy of phosphorus in the animal organism, vitamin K and clinical aspects of vitamin K.

* * * *

The Practice of Veterinary Medicine. By *D. H. Udall,* B.S., D.V.M., D.Sc., Professor of Veterinary Medicine and Superintendent of the Ambulatory Clinic, Emeritus, in the New York State Veterinary College at Cornell University. Fourth revised edition. 723 pages, 102 illustrations. Published by the Author, Ithaca, N. Y., 1943. Price $6.50.

Revisions of Udall's "Veterinary Practice" are assuming a periodicity. Good evidence of both the usefulness of the work and industry of the author. The marked progress that has been made in the control of parasites, the improvements in the treatment of many diseases since the introduction of the sulfa drugs, the better control of some infections by superior vaccines, the expanding knowledge of nutrition and its effect on the health of animals—all are reflected in this new edition of a work that already ranked first in its field and has done much to raise the average of veterinary service.

* * * *

A Text-Book of the Diseases of the Small Domestic Animals. By *Oscar Victor Brumley,* D.V.M., Dean of the College of Veterinary Medicine and Professor of Veterinary Medicine, the Ohio State University. Fourth edition, revised. 422 pages, 37 illustrations. Published by Lea and Febiger, Philadelphia, 1943. Price $5.00.

This work is intended for students in veterinary colleges and is arranged in textbook style. However, it contains much valuable reference material for veterinary practitioners, systematically arranged and adequately indexed. All important diseases of dogs and cats, both medical and surgical, are included. The present edition embodies considerable revision to conform to present knowledge. Additions to the current volume include a small number of illustrations—most of them well chosen. The reader will be astonished upon opening the book at Fig. 1 and discovering a halftone of what appears to be a dog with the caption "Linguatula Serrata."

Brumley's "Small Animal Diseases" has long been a favorite in its field. This fourth edition will increase its popularity.

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Third Nutritional Conference for Veterinarians. The papers delivered on the program of this conference which was held at Decatur, Ind., July 7, 1943, have been collected and published in pamphlet form by the Central Soya Co. The technical veterinary subjects discussed include: (1) Diseases of baby pigs, (2) Nutritional deficiency of calves, (3) Sheep parasites and (4) Enteric problems in swine. Discussions of the feeding of poultry, turkeys, swine and cows are included also. The booklet may be had on request to the Central Soya Co., Fort Wayne, Ind.

You may obtain any book reviewed in this department by remitting the published price to the Book Department of VETERINARY MEDICINE, 7632 S. Crandon Ave., Chicago, Ill.

Horses; Their Selection, Care and Handling. By *Margaret Cabell Self;* Author of "Teaching the Young to Ride." 170 pages, 41 illustrations. A. S. Barnes and Company, Inc., New York, 1943. Price $3.00.

This is a meaty little work that will be found satisfactory alike for the novice and the experienced in horseback riding, in the country, in the parks, at shows, or in the hunt. It is appropriate to the veterinarians' waiting room table or to recommend to clients interested in horses for riding or pleasure driving.

The subjects discussed are: Selection of the horse, selection and care of equipment, the stable, general care, first aid, handling the horse, cause and control of vices, riding, driving, starting the child, and the show ring. A glossary also is included for the beginner but is far from complete or comprehensive.

Some parts of the chapter on "first aid" are a bit naive, but the sound advice to call a veterinarian for both injuries and illnesses unless they be trivial is repeated often.